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ENVIRONMENTAL RESEARCH

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

2019-05-20

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 as geography, habitat, human or ecological risks, and other local factors.

Authors: Pelletier D, Sacks VP, Sorensen M, Magar V.

Full Source: Integrated Environmental Assessment and Management. 2019 Apr 26. doi: 10.1002/ieam.4162. [Epub ahead of print]

Sediment remediation goals for four common contaminants at contaminated sediment sites throughout the United States were evaluated to determine significant trends and evaluate causes of those trends

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

2019-05-20

In this study, the authors investigated the effect of a multimineral preparation on the health and growth of spring born, dairy calves were 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]

In this study, the authors investigated the effect of a multi-mineral preparation on the health and growth of spring born, dairy calves were investigated on four New Zealand pastoral farms.

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

2019-05-20

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 $\pm 1 \log_{10}$ 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 \log_{10} genome copies/bee for ABPV, between 3.0 and 10.0 \log_{10} genome copies/bee for BQCV, between 2.4 and 10.4 \log_{10} genome copies/bee for DWV and between 3.4 and 10.4 \log_{10} genome copies/bee for SBV. Outside these ranges, the results' uncertainty is higher. VDV1 RT-qPCR accuracy was outside validation limits for all viral loads. Using these RT-qPCR methods, the authors 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.

Full Source: Journal of Virology Methods. 2019 Apr 23. pii: S0166-0934(18)30600-1. doi: 10.1016/j.jviromet.2019.04.020. [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 sphenoccephala*)

2019-05-20

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 sphenoccephala*) larvae were exposed to one of eight individual or combined treatments of atrazine, ammonium nitrate fertilizer, 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.

Authors: Adelizzi R, Portmann J, Van Meter R.

Full Source: Archives in Environmental Contamination & Toxicology. 2019 Apr 24. doi: 10.1007/s00244-019-00629-6. [Epub ahead of print]

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

2019-05-20

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

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.

show trends in sensitivity ordering. Overall, our results suggest that protective benchmarks retrieved from SSDs built with the responses of standard planktonic organisms (which are the most commonly used for regulation purposes) do not adequately protect benthic communities.

Authors: Vidal T, Santos JI, Queirós L, Ré A, Abrantes N, Gonçalves FJM, Pereira JL.

Full Source: Science of the Total Environment. 2019 Jun 10; 668:1289-1297. doi: 10.1016/j.scitotenv.2019.03.067. Epub 2019 Mar 6.

MEDICAL RESEARCH

Protective Effects of N-Acetyl-L-Cysteine on the Density of Spiral Ganglion Cells and Histological Changes Induced by Continuous Noise Exposure in Rats

2019-05-20

Noise exposure causes loss of cochlea hair cells, leading to permanent sensorineural hearing loss, and initiates pathological changes to the bipolar primary auditory neurons (ANs). This study focuses on the effects of N-acetyl-L-cysteine (NAC) in protecting the density of spiral ganglion cells and in histological changes induced by continuous noise exposure in rats. Twenty-four male Wistar rats were randomly allocated into four experimental groups to receive NAC, saline, noise, or both noise and NAC. Noise exposure continued for ten days. Saline and NAC were injected daily during the noise exposure, and 2 days before and after the noise exposure. Evaluation of cochlear histopathology and the density of spiral ganglion cells was performed 21 days after exposure. In the animals exposed to noise, a reduction in the density of spiral ganglion cells was evident in both the basal and middle turns of the cochlea. This improved on receiving NAC treatment ($P = 0.046$). In the histopathology evaluation, some histological changes, such as disorganised architecture of the outer hair and supporting cells and a slightly thickened basilar membrane, were found in the basal turns in the noise group. Then authors concluded that NAC offered partial protection against noise exposure by improving the density of spiral ganglion cells and reducing morphological changes.

Authors: Habybabady RH, Mortazavi SB, Khavanin A, Mirzaei R, Arab MR, Mesbahzadeh B, Hoseini M, Mohammadi M.

Full Source: Malaysian Journal of Medical Sciences. 2018 Sep;25(5):48-58. doi: 10.21315/mjms2018.25.5.5. Epub 2018 Oct 30.

This study focuses on the effects of N-acetyl-L-cysteine (NAC) in protecting the density of spiral ganglion cells and in histological changes induced by continuous noise exposure in rats.

Lead exposure-induced cognitive impairment through RyR-modulating intracellular calcium signalling in aged rats.

2019-05-20

Lead is widely distributed in the environment and has become a global public health issue. It is well known that lead exposure induces not only neurodevelopmental toxicity but also neurodegenerative diseases, with learning and memory impairment in the later stage. However, the molecular mechanisms remain elusive. The present study investigated the effects of early life and lifetime lead exposure on cognition and identified the molecular mechanisms involved in aged rats. The results demonstrated that the lead concentration in peripheral blood and brain tissues in aged rats was significantly increased in a lead dose-dependent manner. High-dose lead exposure caused cognitive functional impairment in aged rats, concomitant with a longer escape latency and a lower frequency of crossing the platform via Morris water maze testing compared to those in the control and low-dose lead exposure groups. Importantly, neuron functional defects were still observed even in early life lead exposure during the prenatal and weaning periods in aged rats. The neurotoxicity induced by lead exposure was morphologically evidenced by a recessed nuclear membrane, a swollen endoplasmic reticulum, and mitochondria in the neurons. Mechanistically, the exposure of aged rats to lead resulted in increasing free calcium concentration, reactive oxygen species, and apoptosis in the hippocampal neurons. Lead exposure increased RyR3 expression and decreased the levels of p-CaMKII α /CaMKII α and p-CREB/CREB in the hippocampus of aged rats. These findings indicated that early life lead exposure-induced cognition disorder was irreversible in aged rats. Lead-induced neurotoxicity might be related to the upregulation of RyR3 expression and high levels of intracellular free calcium with increasing lead concentration in injured neurons.

Authors: Ouyang L, Zhang W, Du G, Liu H, Xie J, Gu J, Zhang S, Zhou F, Shao L, Feng C, Fan G.

Full Source: Toxicology. 2019 Mar 21; 419:55-64. doi: 10.1016/j.tox.2019.03.005. [Epub ahead of print]

The present study investigated the effects of early life and lifetime lead exposure on cognition and identified the molecular mechanisms involved in aged rats.

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

2019-05-20

In the present study, 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 polytetrafluoroethylene-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 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]

Therapeutic effects of scavenger receptor MARCO ligand on silica-induced pulmonary fibrosis in rats

2019-05-20

Pulmonary fibrosis induced by prolonged exposure to silica particles is a chronic and irreversible lung disease without effective treatment till now. In a previous study, the authors showed that early intervention with MARCO antagonist PolyG could alleviate pulmonary fibrosis in silica-exposed rats. However, the therapeutic effects of PolyG on silica-induced pulmonary fibrosis have rarely been reported. In this study, the authors explored the effects of administration (on the 28th day after silica exposure) of PolyG (MARCO inhibitor) on an established rat silicosis model. The lungs were analysed histopathologically in rats using HE and Masson staining. The silica-induced ERS-related apoptosis, EMT and fibrosis were evaluated using western blotting, qRT-PCR and immunohistochemical analyses. The results suggested that silica exposure could increase the MARCO activity, and induce ERS and EMT in lung tissues. Pharmacological targeting of MARCO with PolyG attenuated the development of pulmonary fibrosis in silica-exposed rats. Further study indicated that PolyG could inhibit silica-induced ERS-related apoptosis and EMT process.

In this study, the authors explored the effects of administration of PolyG (MARCO inhibitor) on an established rat silicosis model.

Together, the findings reveal an essential function of ERS-related apoptosis and EMT in the processes of pulmonary fibrosis caused by silica, and identify MARCO as a potential therapeutic pharmacological target for silicosis.

Authors: Yang M, Wang N, Li W, Li H, Zhao Y, Yao S, Chen W.

Full Source: Toxicology Letters. 2019 Apr 24; 311:1-10. doi: 10.1016/j.toxlet.2019.04.026. [Epub ahead of print]

Different biological effects of PM_{2.5} from coal combustion, gasoline exhaust and urban ambient air relate to the PAH/metal compositions

2019-05-20

Few studies have compared the biological effects of PM_{2.5} from coal combustion, gasoline exhaust and urban ambient air, and the roles of polycyclic aromatic hydrocarbons (PAHs) and metals playing in the process remain unclear. In this study, PM_{2.5} samples from coal combustion, gasoline exhaust and urban ambient air were analysed for 16 PAHs and 23 metals. Cytotoxic and inflammatory effects of different PM_{2.5} were evaluated on differentiated THP-1 and A549 cells, respectively. The authors found that the coal combustion PM_{2.5} samples induced stronger cytotoxic and inflammatory effects ($p < 0.05$). Pearson's correlation and principal component analysis showed that the PAHs containing four or more benzenoid rings and specific metals of cadmium, thallium, zinc and lead were positively related to the biological effects. The results suggested that coal combustion PM_{2.5} might be a more serious health hazard. Specific PAHs and metals might account for the PM_{2.5} induced biological effects.

Authors: Cui X, Zhou T, Shen Y, Rong Y, Zhang Z, Liu Y, Xiao L, Zhou Y, Li W, Chen W.

Full Source: Environmental Toxicology & Pharmacology. 2019 Apr 17; 69:120-128. doi: 10.1016/j.etap.2019.04.006. [Epub ahead of print]

Effects of cooking oil fume derived fine particulate matter on blood vessel formation through the VEGF/VEGFR2/MEK1/2/ERK1/2/mTOR pathway in human umbilical vein endothelial cells

2019-05-20

In China, cooking oil fume derived fine particulate matter (COF-derived PM_{2.5}) is a principal source of indoor air pollution. This study investigated cytotoxicity of COF-derived PM_{2.5}, as well as the roles of VEGF, VEGFR2,

In this study, PM_{2.5} samples from coal combustion, gasoline exhaust and urban ambient air were analysed for 16 PAHs and 23 metals.

MEK1/2, ERK1/2, and mTOR cascade in the inhibitory effects of COF-derived PM2.5, on angiogenesis in human umbilical vein endothelial cells (HUVECs). After exposure to COF-derived PM2.5, cell viability and tube formation, as well as protein and mRNA levels of VEGF, VEGFR2, MEK1/2, ERK1/2, and mTOR in HUVECs were measured. Cell viability and number of tubes reduced dose-dependently after COF-derived PM2.5 and SU5416 treatment. In addition, SU5416 and VEGF significantly affected tube formation. The protein and mRNA levels of VEGF, VEGFR2, MEK1/2, ERK1/2, and mTOR all tended to reduce with the increase of COF-derived PM2.5 concentrations. These findings demonstrate that VEGF, VEGFR2, MEK1/2, ERK1/2, and mTOR play key roles in COF-derived PM2.5 induced inhibition of angiogenesis in HUVECs.

Authors: Zhu F, Cheng H, Lei R, Shen C, Liu J, Hou L, Zhang C, Xu Y, Ding R, Cao J.

Full Source: Environmental Toxicology & Pharmacology. 2019 Apr 19; 69:112-119. doi: 10.1016/j.etap.2019.04.008. [Epub ahead of print]

OCCUPATIONAL RESEARCH

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

2019-05-20

This study was undertaken to understand 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 oedema throughout the subcortical white matter, the bilateral globus pallidus, and the cerebellar dentate nuclei. The brain biopsy confirmed severe cerebral oedema, 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

This study was undertaken to understand the clinical and pathological features of 1,2-dichloroethane (DCE) toxic encephalopathy.

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.00000000000015273.

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

2019-05-20

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.

Full Source: *Occupational & Environmental Medicine*. 2019 Apr 25. pii: oemed-2019-105691. doi: 10.1136/oemed-2019-105691. [Epub ahead of print]

Zika virus in workers: Considerations for ongoing exposure prevention

2019-05-20

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 study summarises 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 here.

Full Source: American Journal of Industrial Medicine. 2019 Apr 26. doi: 10.1002/ajim.22978. [Epub ahead of print]

Authors: Brown CK, Shugart JM.

This study summarises 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.

Tobacco Evidence-Based Practice Implementation and Employee Tobacco-Related Outcomes at Small Low-Wage Worksites

2019-05-20

This study assessed whether tobacco policy, program, and communication evidence-based practice implementation is associated with employee tobacco outcomes (current smoking; quit attempt; smokeless tobacco (SLT) use; and perceived worksite support for cessation) at small low-wage worksites. The authors analysed data from a randomised controlled trial testing an intervention to increase implementation of evidence-based

health promotion practices. Generalised estimating equations were used to examine relationships between practice implementation and tobacco outcomes. Communication practice implementation was associated with better perceived worksite support for cessation ($p=0.027$). Policy and program implementation were associated with increased odds of being a current SLT user; these findings should be interpreted with caution given small sample sizes. Tobacco communication evidence-based practice implementation was associated with favourable perceptions of worksite support for cessation; more may be needed to change tobacco use behaviour.

Authors: Kava CM, Harris JR, Gary Chan KC, Kohn MJ, Parrish AT, Hannon PA.

Full Source: Journal of Occupational & Environmental Medicine. 2019 Apr 19. doi: 10.1097/JOM.0000000000001618. [Epub ahead of print]

Work Exposures and Musculoskeletal Disorders Among Railroad Maintenance-of-Way Workers

2019-05-20

This study measured musculoskeletal disorders and occupational risk factors among railroad maintenance-of-way (MOW) workers. 4,816 active, retired and disabled members of the Brotherhood of Maintenance of Way Employees Division (BMWED) completed a survey. Compared to U.S. employed men, adjusting for age, race and region, active male MOW workers were more likely to report "repeated lifting, pushing, pulling, or bending" at work (74.6% vs. 46.9%), not enough staff (88.1% vs. 65.2%) and a diagnosis of carpal tunnel syndrome (7.9% vs. 3.6%). They were less likely to report management priority on workplace health and safety (59.37% vs. 94.8%), ability to make job decisions on their own (68.4% vs. 87.7%), and supervisor support (60.3% vs. 90.8%) (all comparisons, $p<0.001$). Prevention programs should address risk of musculoskeletal disorders and occupational hazards faced by MOW workers.

Authors: Landsbergis P, Johanning E, Stillo M, Jain R, Davis M.

Full Source: Journal of Occupational & Environmental Medicine. 2019 Apr 19. doi: 10.1097/JOM.0000000000001614. [Epub ahead of print]

This study measured musculoskeletal disorders and occupational risk factors among railroad maintenance-of-way (MOW) workers.

PUBLIC HEALTH RESEARCH

Phthalate exposure increases subclinical atherosclerosis in young population

2019-05-20

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, the authors 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), Σ 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, Σ 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 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, Σ DEHP, and MnBP are strongly associated with CIMT in adolescents and young adults in Taiwan.

Authors: Su TC, Hwang JS, Torng PL, Wu C, Lin CY, Sung FC.

Full Source: Environmental Pollution. 2019 Apr 8; 250:586-593. doi: 10.1016/j.envpol.2019.04.006. [Epub ahead of print]

Possible pathogenic roles of nitric oxide in asthma

2019-05-20

Nitric oxide (NO) has broad physiologic functions, including vasodilation, bronchodilatation, neurotransmission, inflammation, and host defence. Fraction of exhaled NO (FeNO) is used as a biomarker of eosinophilic airway inflammation for asthma control. However, the role of NO in the pathogenesis and progression of asthma is not well understood. Additionally, the absence of bronchial eosinophilic inflammation, mucus

hypersecretion, and increased Th2 cytokine levels in mice lacking NO synthase isoforms (n/i/eNOS^{-/-}), suggests that NO has an essential role in the promoting the pathogenesis of asthma. Recent clinical data investigating antibodies for interleukin (IL)-4 receptor α , which inhibits both IL-4 and IL-13 signalling, and anti-IL-13 antibody suggest a unique association between NO and the pathogenesis and progression of asthma. Antibody therapies targeting several cytokines may provide clues to elucidate the mechanisms underlying the pathogenesis and progression of asthma.

Authors: Yatera K, Mukae H.

Full Source: Respiratory Investigation. 2019 Apr 22. pii: S2212-5345(18)30310-1. doi: 10.1016/j.resinv.2019.03.007. [Epub ahead of print]

Milk Consumption Across Life Periods in Relation to Lower Risk of Nasopharyngeal Carcinoma: A Multicentre Case-Control Study

2019-05-20

The much higher incidence of nasopharyngeal carcinoma (NPC) in men suggests sex hormones as a risk factor, and dairy products contain measurable amounts of steroid hormones. Milk consumption has greatly increased in endemic regions of NPC. In the present study, the authors investigated the association between NPC and milk consumption across life periods in Hong Kong. Methods: A multicentre case-control study included 815 histologically confirmed NPC incident cases and 1,502 controls who were frequency-matched on age and sex at five major hospitals in Hong Kong in 2014-2017. Odds ratios (ORs) of NPC (cases vs. controls) for milk consumption at different life periods were estimated by unconditional logistic regression, adjusting for sex, age, socioeconomic status score, smoking and alcohol drinking status, exposure to occupational hazards, family history of cancer, IgA against Epstein-Barr virus viral capsid antigen, and total energy intake. Compared with abstainers, lower risks of NPC were consistently observed in regular users (consuming ≥ 5 glasses of milk [fresh and powdered combined] per month) across four life periods of age 6-12 (adjusted OR 0.74, 95% CI 0.54-0.86), 13-18 (0.68, 0.55-0.84), 19-30 (0.68, 0.55-0.84), and 10 years before recruitment (0.72, 0.59-0.87). Long-term average milk consumption of ≤ 2.5 , > 2.5 , and ≤ 12.5 , > 12.5 glasses per month yielded adjusted OR (95% CI) of 1.00 (0.80-1.26), 0.98 (0.81-1.18), 0.95 (0.76-1.18), and 0.55 (0.43-0.70), respectively (all P-values for trend < 0.05). Conclusion: Consumption of milk across life periods was associated with lower risks of NPC. If confirmed to be

In the present study, the authors investigated the association between nasopharyngeal carcinoma and milk consumption across life periods in Hong Kong.

causal, this has important implications for dairy product consumption and prevention of NPC.

Authors: Mai ZM, Lin JH, Ngan RK, Kwong DL, Ng WT, Ng AW, Yuen KT, Ip DKM, Chan YH, Lee AW, Ho SY, Lung ML, Lam TH.

Full Source: *Frontiers in Oncology*. 2019 Apr 10; 9:253. doi: 10.3389/fonc.2019.00253. eCollection 2019.

When are Adverse Outcome Pathways and Associated Assays “Fit for Purpose” for Regulatory Decision-Making and Management of Chemicals?

2019-05-20

There have been increasing demands for chemical hazard and risk assessments in recent years. Chemical companies have expanded internal product stewardship initiatives, and jurisdictions have increased the regulatory requirements for the manufacture and sale of chemicals. There has also been a shift in chemical toxicity evaluations within the same timeframe with new methodologies being developed to improve chemical safety assessments for both human health and the environment. With increased needs for chemical assessments coupled with more diverse data streams from new technologies, regulators and others tasked with chemical management activities are faced with increasing workloads and more diverse types of data to consider. The Adverse Outcome Pathway (AOP) framework can be applied in different scenarios to integrate data and guide chemical assessment and management activities. In this study, scenarios of how AOPs can be used to guide chemical management decisions during research and development, chemical registration, and subsequent regulatory activities like prioritisation and risk assessment are considered. Furthermore, specific criteria (e.g. the type and level of AOP complexity, confidence in the AOP, as well as external review and assay validation) are proposed to examine whether AOPs and associated tools are fit for purpose when applied in different contexts. Certain toxicity pathways are recommended as priority areas for AOP research and development, and the continued use of AOPs and defined approaches in regulatory activities are recommended. Furthermore, a call for increased outreach, education and enhanced use of AOP databases are proposed to increase their utility in chemicals management.

Authors: Coady K, Browne P, Embry M, Hill T 3rd, Leinala E, Steeger T, Maślankiewicz L, Hutchinson T.

Full Source: *Integrated Environmental Assessment and Management*. 2019 Mar 25. doi: 10.1002/ieam.4153. [Epub ahead of print]

In this study, scenarios of how adverse outcome pathways can be used to guide chemical management decisions during research and development, chemical registration, and subsequent regulatory activities like prioritisation and risk assessment are considered.

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

2019-05-20

It has been suggested that persistent organic pollutants (POPs) are harmful to human health. In this study, the authors 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. 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, 1.08-1.55; 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 noncardiovascular 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

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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, Stubbleski J, Kärrman A, Lind L.

Full Source: JAMA Network Open. 2019 Apr 5;2(4):e193070. doi: 10.1001/jamanetworkopen.2019.3070.