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ENVIRONMENTAL RESEARCH

Nickel toxicity in plants: reasons, toxic effects, tolerance mechanisms, and remediation possibilities-a review

2019-05-06

Nickel (Ni) is a naturally occurring metal, but anthropogenic activities such as industrialisation, use of fertilisers, chemicals, and sewage sludge have increased its concentration in the environment up to undesirable levels. Ni is considered to be essential for plant growth at low concentration; however, Ni pollution is increasing in the environment, and therefore, it is important to understand its functional roles and toxic effects on plants. This review emphasises the environmental sources of Ni, its essentiality, effects, tolerance mechanisms, possible remediation approaches, and research direction that may help in interdisciplinary studies to assess the significance of Ni toxicity. Briefly, Ni affects plant growth both positively and negatively, depending on the concentration present in the growth medium. On the positive side, Ni is essential for normal growth, enzymatic activities (e.g., urease), nitrogen metabolism, iron uptake, and specific metabolic reactions. On the negative side, Ni reduces seed germination, root and shoot growth, biomass accumulation, and final production. Moreover, Ni toxicity also causes chlorosis and necrosis and inhibits various physiological processes (photosynthesis, transpiration) and cause oxidative damage in plants. The threat associated with Ni is increased as Ni concentration increases day by day in the environment, particularly in soils; therefore, it would be hazardous for crop production in the near future. Additionally, the lack of information regarding the mechanisms of Ni tolerance in plants further intensifies this situation. Therefore, future research should be focused on approachable and prominent solutions in order to minimize the entry of Ni into our ecosystems.

Authors: Hassan MU, Chattha MU, Khan I, Chattha MB, Aamer M, Nawaz M, Ali A, Khan MAU, Khan TA.

Full Source: Environmental Science & Pollution Research International. 2019 Mar 29. doi: 10.1007/s11356-019-04892-x. [Epub ahead of print]

This review emphasises the environmental sources of Ni, its essentiality, effects, tolerance mechanisms, possible remediation approaches, and research direction that may help in interdisciplinary studies to assess the significance of Ni toxicity.

Technical

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Age and seasonal variation in testis and baculum morphology in East Greenland polar bears (*Ursus maritimus*) in relation to high concentrations of persistent organic pollutants

2019-05-06

Persistent organic pollutants (POPs) are found in high concentrations in the Arctic. Polar bears (*Ursus maritimus*) are one of the most exposed mammals in the Arctic and are thereby vulnerable to reproductive disruption. The aim of this study was to investigate male polar bear reproduction based on a detailed evaluation of testis histology and to assess possible effects of environmental chemicals on male polar bear reproduction. Reproductive groups that were identified based on histology were as follows: actively reproductive (REP), non-reproductive either with degenerated testes (DEG), undeveloped seminiferous tubules (UND), or morphology in-transition (INT). Categorization into these groups was supported by significant differences in testis and baculum measurements among REP, DEG, and UND, as well as differences in the area and diameter of seminiferous tubules among REP, DEG, and UND. These results show that it is possible to identify the reproductive stage in polar bears even if capture date and or age is lacking. Based on testis morphology we suggest that adult male polar bears from East Greenland have active spermatogenesis in February to June, and inactive degenerated testes in August to January. January to February was the main period of reproductive transition, characterised by a shift between inactive and active spermatogenesis. Baculum and testis size measurements decreased significantly with increasing concentrations of the chlordanes metabolite oxychlordanes, suggesting a potential impact on male reproductive success. Half of the investigated polar bears in REP group displayed signs of disorganisation of the spermatogenesis which might be a sign of disrupted reproduction. However, no correlations with levels of the investigated POPs were detected. Reproductive organ measurements in polar bears differed significantly between REP and DEG groups, which cannot be explained by age, and therefore should be considered when investigating the effect of POPs on male reproduction.

Authors: Spörndly-Nees E, Holm L, van Beest FM, Fakhrzadeh A, Ekstedt E, Letcher R, Magnusson U, Desforges JP, Dietz R, Sonne C.

Full Source: Environmental Research. 2019 Mar 20; 173:246-254. doi: 10.1016/j.envres.2019.03.036. [Epub ahead of print]

In this study, the authors developed a mass defect filter for the detection and tentative identification of twelve potential chlorinated organophosphate flame retardants transformation products.

Mass defect filtering for suspect screening of halogenated environmental chemicals: A case study of chlorinated organophosphate flame retardants

2019-05-06

Organophosphate flame retardants (OPFRs) are a class of flame retardants widely found in environmental and biological matrices that have been extensively studied due to their adverse health effects in humans. OPFRs are loosely bound chemicals that can detach from treated products and be released into indoor and outdoor environments, where they have the potential to further undergo transformation and degradation processes, in particular the chlorinated OPFRs (Cl-PFRs). Their detection remains a moving target for analysts, and traditional targeted mass spectrometry methods are suitable only for those compounds with authentic standards. Mass defect filter (MDF) is a strategy to filter molecular features using thresholds applied to the mass defect value of a target ion or molecular feature of interest. The authors have developed an MDF strategy for the detection and tentative identification of twelve potential Cl-PFR transformation products in a study mixture of six known Cl-PFRs using MS/MS data acquired on a high-resolution mass spectrometer. Most compounds in the Cl-PFRs family share a ClO₄ P group as a core structure, of which modification results in a significant shift in the exact masses of the resulting compounds but show only a minimal shift in their mass defects. Subsequently, the MDF strategy was employed to tentatively identify Cl-PFRs retrospectively in six human urine samples that had previously been analysed. MDF in combination with product ion filtering for the characteristic [H₂ O₃ P]⁺ and [H₄ O₄ P]⁺ ions and neutral loss filtering for the characteristic C_n H_{2n-x} Cl_x group resulted in revealing suspects and homologues in the Cl-PFRs family. Furthermore, the MDF of the product ions detected additional Cl-PFR-related compounds that differed significantly in the exact masses of both precursor and product ions but had minimal shift in the mass defects of product ions. The mass defect of one or more common product ions helped to detect a few Cl-PFR analogues that had not been identified by MDF of the core structure precursor ion. MDF helped to detect some Cl-PFRs present in lower concentrations, which went undetected without data filters. MDF also helped to detect chromatographic peaks for Cl-PFR homologues that are likely structural analogues that resulted from impurities and/or derivatives and transformation products. The methodology was applied to

demonstrate and tentatively detect known and suspect Cl-PFRs in human urine samples retrospectively.

Authors: Dolios G, Patel D, Arora M, Andra SS.

Full Source: Rapid Communications in Mass Spectrometry. 2019 Mar 15;33(5):503-519. doi: 10.1002/rcm.8370.

Biomagnification of PBDEs and alternative brominated flame retardants in a predatory fish: Using fatty acid signature as a primer

2019-05-06

Information on biomagnification of alternative brominated flame retardants (ABFRs) is limited and results are inconclusive, due in part to uncertainty in the understanding of predator/prey relationships. In the present study, a predatory fish, *Channa argus*, and several forage fish species were obtained from an ABFR contaminated site. The predator/prey relationships were identified based on fatty acid (FA) signatures in the predator and prey. Biomagnification factors (BMFs) for several ABFRs including decabromodiphenyl ethane (DBDPE), 1,2-bis(2,4,6-tribromophenoxy) ethane (BTBPE), hexabromobenzene (HBB), pentabromotoluene (PBT), and pentabromoethylbenzene (PBEB) were estimated based on the identified predator/prey relationships. The results showed that crucian carp was the main prey of *C. argus*, contributing to 71%-100% to its total diet. The mean BMFs for DBDPE, BTBPE, and HBB were 0.06, 0.40, and 0.91, respectively, indicating trophic dilution of these ABFRs. However, biomagnification of PBT and PBEB, with BMFs of 2.09 and 2.13, respectively, was observed. The BMFs for PBT, PBEB and HBB were comparable to or even higher than those for some polybrominated diphenyl ether (PBDE) congeners estimated in the same individual predator, indicating that these emerging pollutants may pose significant environmental risks. The BMFs for ABFRs and PBDEs were significantly and negatively correlated to the log KOWs of these chemicals, suggesting that the biomagnification of these chemicals was depressed due to their superhydrophobic nature.

Authors: Tao L, Zhang Y, Wu JP, Wu SK, Liu Y, Zeng YH, Luo XJ, Mai BX.

Full Source: Environment International. 2019 Mar 28; 127:226-232. doi: 10.1016/j.envint.2019.03.036. [Epub ahead of print]

Technical

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Diverse single-stranded DNA viruses associated with honey bees (*Apis mellifera*)

2019-05-06

In the present study, the authors used a metagenomics-based approach to reveal the presence of a broad range of novel single-stranded DNA viruses from the hemolymph and brain of nurse and forager (worker divisions of labour) bees belonging to two honey bees subspecies Honey bees (*Apis mellifera*) research has increased in light of their progressive global decline over the last decade and the important role they play in pollination.

One expanding area of honey bee research is analysis of their microbial community including viruses. Several RNA viruses have been characterised but little is known about DNA viruses associated with bees. In the present study, the authors used a metagenomics-based approach to reveal the presence of a broad range of novel single-stranded DNA viruses from the hemolymph and brain of nurse and forager (worker divisions of labour) bees belonging to two honey bees subspecies, Italian (*Apis mellifera linguistica*) and New World Carniolan (*Apis mellifera carnica*). Genomes of 100 diverse viruses were identified, designated into three groupings; genomoviruses (family Genomoviridae) (n = 4), unclassified replication associated protein encoding single-stranded DNA viruses (n = 28), and microviruses (family Microviridae; subfamily Gokushovirinae) (n = 70). Amongst the viruses identified, it appears that nurses harbour a higher diversity of these viruses comparative to the foragers. Between subspecies, the most striking outcome was the extremely high number of diverse microviruses identified in the Italian bees comparative to the New World Carniolan, likely indicating an association to the diversity of the bacterial community associated with these subspecies.

Authors: Kraberger S, Cook CN, Schmidlin K, Fontenele RS, Bautista J, Smith B, Varsani A.

Full Source: *Infection, Genetics and Evolution*. 2019 Mar 27; 71:179-188. doi: 10.1016/j.meegid.2019.03.024. [Epub ahead of print]

In this study, the authors explored the association between urinary parabens of pregnant women and GDM and studied the modification effect of prepregnancy body mass index (BMI).

MEDICAL RESEARCH

Association between urinary parabens and gestational diabetes mellitus across prepregnancy body mass index categories

2019-05-06

Increasing evidence suggests a potential role of endocrine disrupting chemicals (EDCs) in inducing gestational diabetes mellitus (GDM).

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However, as far as we know, no study has examined the associations between GDM and exposure to parabens, a kind of EDCs. In this study, the authors explored the association between urinary parabens of pregnant women and GDM and studied the modification effect of prepregnancy body mass index (BMI). Urine samples were collected from 696 pregnant women and parabens were measured, including four alkyl side chain substituted para-hydroxybenzoic acid ester, substituents varying from methyl to butyl (abbreviates as MeP, EtP, PrP and BuP), and benzyl substituted para-hydroxybenzoic acid ester (BzP). Logistic regression models adjusting for potential confounders were used to study the association of parabens and GDM in the overall population, and further stratified analysis by prepregnancy BMI categories was also performed. The detection rates for the five parabens in the urine samples were 97.70% (MeP), 71.26% (EtP), 96.55% (PrP), 15.80% (BuP) and 2.73% (BzP). No significant association was found between parabens and GDM among the overall population. However, significant non-linear associations of PrP and the summed oestrogenic activity of parabens with GDM were found in the stratified analysis by prepregnancy BMI in the overweight/obese population, with adjusted odds ratios (aORs) of 3.47 (95% CI: 1.28, 9.42) and 2.87 (95% CI: 1.07, 7.73) for GDM in the second tertile of urinary PrP and the summed oestrogen activity, respectively, when compared to the first tertile. Although no statistically significant association between parabens and GDM was found in the overall population, the authors found that among the overweight/obese pregnant women, who represent a subgroup more prone to GDM, moderately higher levels of PrP and summed oestrogenic activity of parabens were significantly associated with an increasing GDM prevalence.

Authors: Li Y, Xu S, Li Y, Zhang B, Huo W, Zhu Y, Wan Y, Zheng T, Zhou A, Chen Z, Huang Z, Hu J, Zhang W, Wang X, Ye D, Xia W.

Full Source: Environmental Research. 2019 Mar; 170:151-159. doi: 10.1016/j.envres.2018.12.028. Epub 2018 Dec 15.

Diets contaminated with Bisphenol A and Di-isononyl phthalate modify skeletal muscle composition: A new target for environmental pollutant action

2019-05-06

In the last few years, an increasing number of studies reported that food pollution represents a significant route of exposure to environmental toxicants, able to cause mild to severe food illnesses and health problems, including hormonal and metabolic diseases. Pollutants can accumulate in organisms and biomagnify along the food web, finally targeting top

In this study, adults of gilthead sea bream, *Sparus aurata*, were fed with diets contaminated with Bisphenol A (BPA) and Di-isononyl phthalate (DiNP) to evaluate the effects of the contamination on the muscle macromolecular composition and alterations of its texture.

consumers causing health and economic problems. In this study, adults of gilthead sea bream, *Sparus aurata*, were fed with diets contaminated with Bisphenol A (BPA) (4 and 4000 $\mu\text{g BPA kg}^{-1} \text{ bw day}^{-1}$) and Di-isononyl phthalate (DiNP) (15 and 1500 $\mu\text{g DiNP kg}^{-1} \text{ bw day}^{-1}$), to evaluate the effects of the contamination on the muscle macromolecular composition and alterations of its texture. The analysis conducted in the muscle using infrared microspectroscopy, molecular biology and biochemical assays, showed, in fish fed BPA contaminated diets, a decrease of unsaturated lipids and an increase of triglycerides and saturated alkyl chains.

Conversely, in fish fed DiNP, a decrease of lipid content, caused by a reduction of both saturated and unsaturated chains and triglycerides was measured. Protein content was decreased by both xenobiotics evidencing a novel macromolecular target affected by these environmental contaminants. In addition, in all treated groups, proteins resulted more phosphorylated than in controls. Calpain and cathepsin levels, orchestrating protein turnover, were deregulated by both xenobiotics, evidencing alterations of muscle composition and texture. In conclusion, the results obtained suggest the ability of BPA and DiNP to modify the muscle macromolecular building, advising this tissue as a target of Endocrine-Disrupting Chemicals (EDCs) and providing a set of biomarkers as possible monitoring endpoints to develop novel OECD test guidelines.

Authors: Carnevali O, Giorgini E, Canuti D, Mylonas CC, Forner-Piquer I, Maradonna F.

Full Source: *Science of the Total Environment*. 2019 Mar 25; 658:250-259. doi: 10.1016/j.scitotenv.2018.12.134. Epub 2018 Dec 11

Associations of serum perfluoroalkyl substance and vitamin D biomarker concentrations in NHANES, 2003-2010

2019-05-06

Perfluoroalkyl substances (PFAS) are persistent endocrine disrupting chemicals found in industrial and commercial products. Previous research has shown that other endocrine disrupting chemicals such as phthalates and bisphenol A may alter circulating levels of vitamin D; however, no research has examined associations between PFAS and vitamin D biomarkers. In the present study, the authors conducted a cross-sectional analysis of 7040 individuals aged 12 years and older participating in the 2003-2010 cycles of the United States National Health and Nutrition Examination Survey (NHANES). Concentrations of perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), perfluorohexane sulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and total 25-hydroxyvitamin D [25(OH)D] were measured in serum samples. Multivariable linear

In this study, multivariable linear regression was used to estimate covariate-adjusted differences in total 25(OH)D or prevalence odds of vitamin D deficiency per log₂ change in PFAS concentrations.

regression was used to estimate covariate-adjusted differences in total 25(OH)D or prevalence odds of vitamin D deficiency per log₂ change in PFAS concentrations. We also assessed potential effect measure modification by gender, age, and race/ethnicity. PFAS were detected in over 98% of the samples. In adjusted models, each 2-fold increase in PFOS was associated with 0.9 nmol/L (95% CI: 0.2, 1.5) lower total 25(OH)D concentrations, with associations significantly stronger among whites (β : -1.7; 95% CI: -2.6, -0.7) and individuals older than 60 years of age (β : -1.7; 95% CI: -2.9, -0.5). Each 2-fold increase in PFHxS was associated with 0.8 nmol/L (95% CI: 0.3, 1.3) higher total 25(OH)D, and this association was not modified by age, gender, and race/ethnicity. PFOA and PFNA were not associated with total 25(OH)D. When assessing prevalence odds of vitamin D deficiency, the authors observed similar patterns of association with PFAS concentrations. These results suggest that some PFAS may be associated with altered vitamin D levels in the United States population, and associations may vary by chemical, age, and race/ethnicity. Prospective epidemiological studies are needed to confirm our findings and determine their implications for vitamin D-associated health outcomes in children and adults.

Authors: Etzel TM, Braun JM, Buckley JP.

Full Source: International Journal of Hygiene & Environmental Health. 2019 Mar;222(2):262-269. doi: 10.1016/j.ijheh.2018.11.003. Epub 2018 Nov 28.

Epidemiologic profile of deaths due to drug and chemical poisoning in patients referred to Baharloo Hospital of Tehran, 2011 to 2014

2019-05-06

In developing countries with high mortality rates, poisoning is one of the most common causes of admission to emergency rooms. To minimise future deaths related to poisoning, the epidemiological profile of deceased individuals is essential. The medical records of all dead patients due to poisoning during 2011-2014 in Baharloo Hospital, Tehran, were evaluated. Exclusion criteria include: incomplete records, unknown causes of death, and persons less than 6 years of age. Data analysis was done by means of SPSS at the significance level of $P < 0.05$. The study included 184 males and 65 females. The mean age range was 37.65 ± 16.78 years. The highest mortality rate was seen in the age range of 21-30 years (30.5%). The most common cause of poisoning was aluminium phosphide (101 cases). The average time of hospitalisation was 3.61 days. Most deaths occurred during the first 10 days of admission with intentional poisoning being the most common type (81.5%). The outcome of this study indicates that the

In developing countries with high mortality rates, poisoning is one of the most common causes of admission to emergency rooms.

main cause of death among young people is intentional poisoning with AIP. This study proves that a greater focus when diagnosing mental health patients, as well as an increase in restrictions when accessing lethal drugs and toxins, is crucial.

Authors: Titidez V, Arefi M, Taghaddosinejad F, Behnoush B, Akbar Pour S, Mahboobi M.

Full Source: Journal of Forensic and Legal Medicine. 2019 Feb 19; 64:31-33. doi: 10.1016/j.jflm.2019.02.009. [Epub ahead of print]

Successful Rescue of the Victim Exposed to a Super High Dose of Iridium-192 during the Nanjing Radiological Accident in 2014

2019-05-06

In the present study, the authors report on the interventions taken to treat a patient exposed to high-dose radiation and provide a protocol for treating such patients in the future. The patient, Mr. Wang, was a 58-year-old male janitor who was accidentally exposed to a ^{192}Ir source with an activity of 966.4 GBq or 26.1 Ci. The dose estimated to the lower right limb was 4,100 Gy, whereas the whole-body effective dose was 1.51 Gy. The diagnosis was made according to the results of the patient dose estimation and clinical manifestations. Systemic treatment included stimulating bone marrow hematopoietic cells, enhancing immunity, anti-infection and vitamin supplements. The treatment of radiation-induced skin lesions consisted of several debridements, two skin-flap transplantations and application of mesenchymal stem cells (MSCs). Skin-flap transplantations and MSCs play important roles in the recovery of skin wound. A combination of antibiotics and antimycotic was useful in reducing inflammation. The application of vacuum sealing drainage was effective in removing necrotic tissue and bacteria, ameliorating ischemia and hypoxia of wound tissue, providing a fresh wound bed for wound healing and improving skin or flap graft survival rates. The victim survived the accident without amputation, and function of his highly exposed right leg was partially recovered. These results demonstrate the importance of collaboration among members of a multidisciplinary team in the treatment of this patient.

Authors: Wang YY, Yu DJ, Zhao TL, Dai H, Li Y, Bian HH, Chen WB, Zhang YS, Pu WY, Feng JC, Hu WT, Liu YL.

Full Source: Radiation Research. 2019 Mar 29. doi: 10.1667/RR15274.1. [Epub ahead of print]

In the present study, the authors report on the interventions taken to treat a patient exposed to high-dose radiation and provide a protocol for treating such patients in the future.

OCCUPATIONAL RESEARCH

Simplified procedures for estimation of biological occupational exposure limits

2019-05-06

In this study, the authors simplified the procedures to estimate biological occupational exposure limits (BOELs) by use of the ratio of geometric mean (GM) concentration of un-metabolised organic solvent in urine (U-GM) over GM organic solvent concentration in air (A-GM) (the [U-GM/A-GM] ratio). Occupational Exposure Limits (OELs) and BOELs were cited from publications from the Japan Society of Occupational Health (JSOH) and the American Conference of Governmental Industrial Hygienists (ACGIH). Data on [U-GM/A-GM] and the SLOPE of exposure-excretion regression line were collected from published articles (men and women were treated separately). Correlation analysis and paired t test were employed as the method to examine statistical significances. Significant linear correlation was established between the SLOPE and the [U-GM/A-GM]. Thus, it was considered to be possible to calculate the SLOPE value from the [U-GM/A-GM]. Previously established equation of $BOEL = SLOPE \times OEL$ allowed to estimate BOEL values in 22 cases of data sets. The comparison of the estimated BOELs with the existing BOELs (JSOH's BOELs and ACGIH's BEIs) in terms of the ratio of [(estimated BOEL)/(existing BOEL)] showed that the ratios for the 22 cases probably distributed log-normally with a GM of 0.85, and the maximum was 5. Therefore, the estimated BOEL may be generally applicable in occupational health when BOEL remains yet to be established. In the worst case, the estimated BOEL may be five times greater than it should be. The recommended procedures for application of estimated BOEL values were described. Simplified procedures for estimation of BOEL values are proposed.

Authors: Kawai T, Sakurai H, Ikeda M.

Full Source: Journal of Occupational Health. 2019 Mar 28. doi: 10.1002/1348-9585.12049. [Epub ahead of print]

Modified CDKN2B (p15) and CDKN2A (p16) DNA methylation profiles in urban pesticide applicators

2019-05-06

Gene-specific changes in DNA methylation by pesticides in occupationally exposed populations have not been studied extensively. Of particular concern are changes in the methylation profile of tumour-suppressor, such as CDKN2B and CDKN2A, genes involved in oncogenesis. The aim

The aim of this study was to evaluate the methylation profiles of CDKN2B and CDKN2A genes in urban pesticide applicators and their relationship with occupational exposure to pesticides.

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of this study was to evaluate the methylation profiles of CDKN2B and CDKN2A genes in urban pesticide applicators and their relationship with occupational exposure to pesticides. A cross-sectional study was conducted in 186 urban pesticide applicators (categorised as high or moderate exposures) and 102 participants without documented occupational exposures to pesticides. Acute and chronic pesticide exposures were evaluated by direct measurement of urinary dialkylphosphates, organophosphate metabolites, and a structured questionnaire, respectively. Anthropometric characteristics, diet, clinical histories, and other variables were estimated through a validated self-reported survey. DNA methylation was determined by pyrosequencing of bisulfite-treated DNA. Decreased DNA methylation of the CDKN2B gene was observed in pesticide-exposed groups compared to the non-exposed group. In addition, increased methylation of the CDKN2A promoter was observed in the moderate-exposure group compared to the non-exposed group. Bivariate analysis showed an association between CDKN2B methylation and pesticide exposure, general characteristics, smoking status, and micronutrients, while changes in CDKN2A methylation were associated with pesticide exposure, sex, educational level, body mass index, smoking status, supplement intake, clinical parameters, and caffeine consumption. These data suggest that pesticide exposure modifies the methylation pattern of CDKN2B and CDKN2A genes and raise important questions about the role that these changes may play in the regulation of cell cycle activities, senescence, and aging.

Authors: Herrera-Moreno JF, Medina-Díaz IM, Bernal-Hernández YY, Ramos KS, Alvarado-Cruz I, Quintanilla-Vega B, González-Arias CA, Barrón-Vivanco BS, Rojas-García AE.

Full Source: Environmental Science & Pollution Research International. 2019 Mar 28. doi: 10.1007/s11356-019-04658-5. [Epub ahead of print]

Former uranium miners of the Wismut Company, East Germany, have been exposed to ionising radiation from radon decay products and therefore were at high risk for lung cancer.

Comparative proteomic analysis in serum of former uranium miners with and without radon induced squamous lung cancer

2019-05-06

Former uranium miners of the Wismut Company, East Germany, have been exposed to ionising radiation from radon decay products and therefore were at high risk for lung cancer. Since histological types of cancer in the so called Wismut cohort revealed an association of high radon exposure with a higher relative frequency of squamous cell carcinoma (SqCC), the authors used comparative proteomic analysis to identify differentially expressed proteins in serum exposed uranium

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miners with SqCC. Pooled sera of exposed former uranium miners without lung disease and pooled sera of former uranium miners with SqCC were analysed by 2-D gel electrophoresis. MALDI-TOF-MS was performed from reproducible, significantly, at least 5-fold up-regulated protein spots. Proteins were identified by MASCOT peptide mass fingerprint search. Additionally, a receiver operating characteristic curve for CYFRA 21-1 was created. The protein spots were identified as Keratin 10 (K10), Keratin 1 (K1), complement factor H (CFH) and a haptoglobin (Hpt) fragment. The sensitivity for CYFRA 21-1 reveals 60% at a specificity of 95 and 80% at a specificity of 80%. Plotting the sensitivity against specificity reveals an AUC of 0.88. In SqCC Keratin 10 and 1 were strongly induced. This was associated with CYFRA 21-1, confirming the cytokeratin fragment as a tumour-marker.

Authors: Helmig S, Lochnit G, Schneider J.

Full Source: Journal of Occupational Medicine & Toxicology. 2019 Mar 15; 14:9. doi: 10.1186/s12995-019-0228-y. eCollection 2019.

Head and neck cancer and occupational exposure to leather dust: results from the ICARE study, a French case-control study

2019-05-06

Leather dust is an established carcinogen of the sinonasal cavities; however, evidence is lacking regarding its association with other head and neck cancers (HNC). To date, few studies have been conducted on the association between occupational leather dust exposure and the risk of oral, pharyngeal, and laryngeal cancers. The objective of this study was to investigate the association between the risk of HNC and occupational exposure to leather dust. Lifestyle habits and occupational history were collected for 2161 patients with squamous cell carcinoma of oral cavity, pharynx, and larynx, and 3555 controls, using a standardized questionnaire. Occupational exposure to leather dust was assessed using a job-exposure matrix. Odds ratios (OR) and 95% confidence intervals (CI) for HNC globally and by subsite were estimated using multivariate unconditional, and polytomous logistic regressions, respectively. Cumulative lifetime exposure to leather dust < 6 mg/m³-years was associated with an increased risk of laryngeal cancer (OR = 2.26, 95% CI: 1.07-4.76); higher levels were not related to elevated risks of HNC. Some tasks performed and the use of some glues were associated with elevated, although non-significant, risks of HNC. No dose-response relationships were observed. This study did not provide enough evidence for an increased risk of HNC related to occupational exposure to leather dust. The

The objective of this study was to investigate the association between the risk of HNC and occupational exposure to leather dust.

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authors concluded that further studies are needed to understand the risks of specific tasks in the leather industry.

Authors: Radoï L, Sylla F, Matrat M, Barul C, Menvielle G, Delafosse P, Stücker I, Luce D; ICARE study group. Collaborators: Guizard AV, Danzon A, Woronoff AS, Velten M, Buemi A, Marrer É, Trétarre B, Colonna M, Delafosse P, Bercelli P, Molinié F, Bara S, Lapotre-Ledoux B, Raverdy N, Cénée S, Gaye O, Guida F, Lamkarkach F, Radoï L, Sanchez M, Stücker I, Carton M, Cyr D, Schmaus A, Févotte J, Pilorget C, Menvielle G, Luce D.

Full Source: Environmental Health. 2019 Mar 29;18(1):27. doi: 10.1186/s12940-019-0469-3.

Short- and Long-Term Effects of a Tobacco-Free Executive Order on Employee Tobacco Use

2019-05-06

Smoke-free workplace policies encourage cessation, reduce tobacco consumption, and shift the pro-tobacco norm. However, no research exists evaluating the impact of mandated tobacco-free policies on government property. The purpose of this study was to examine short- and long-term effects of a tobacco-free policy (executive order 2014-747) implemented in November 2014, prohibiting tobacco use on state executive property. Cross-sectional online surveys were administered at two time points to a total of 27,000 employees of the executive branch of the Commonwealth of Kentucky. The short-term evaluation (March 2015) comprised 4,170 employees and the long term (August 2015) included 3,070. Tobacco use, plans to quit using tobacco, personal characteristics, whether the county of their workplace was covered by a smoke-free policy, and social norms for tobacco use were assessed 4- and 9-month post-policy implementation. Current tobacco use and plans to quit were compared between short- and long-term evaluations using multiple logistic regression with relevant covariates included. Controlling for demographics and employment location, employees reported lower rates of tobacco use and higher rates of planning to quit in the long term than in the short term. Tobacco-free policies reduce tobacco use prevalence and promote plans to quit, particularly over time. The authors found differences in tobacco use prevalence and plans to quit using tobacco products from 4 to 9 months after the policy took effect, as reported by employees following implementation of the tobacco-free policy. These findings support the potential for avoiding long-term health care costs as a result of reduced tobacco use from these policies. Nurses can play an important

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advocacy and policy evaluation role to promote and assess the impact of tobacco-free policies.

Authors: Hahn EJ, Ickes MJ, Wiggins A, Kay Rayens M, Polivka BJ, Whelan Parento E.

Full Source: Policy, Politics, & Nursing Practice. 2019 Mar

28:1527154419833174. doi: 10.1177/1527154419833174. [Epub ahead of print]

PUBLIC HEALTH RESEARCH

Target screening analysis of 970 semi-volatile organic compounds adsorbed on atmospheric particulate matter in Hanoi, Vietnam

2019-05-06

Vietnam's rapid economic development has resulted in dramatic increases in construction and the number of transportation vehicles. There is now growing public concern regarding increasing air pollution, especially in big cities; however, little information is available in air quality, particularly regarding semi-volatile organic compounds (SVOCs) adsorbed on atmospheric particulate matter. In this study, the authors determined the frequency and concentrations of 970 SVOCs in 48 air particle samples collected by means of high-volume air sampling in Hanoi, Vietnam, by using a target screening method and a gas chromatography-mass spectrometry database. A total of 118 compounds (12.2% of the target compounds) were detected at least once in the samples, and the number of chemicals detected in each sample ranged from 85 to 103 (median, 92). For samples collected near a heavily trafficked road, the concentrations of target compounds in the samples were higher in samples collected during the day than in those collected at night, whereas the opposite was true for samples collected in a highly populated residential area with industrial activities related to the production of fresh noodles. Sixteen PAHs were detected at high concentrations in nearly 100% of the samples. Eighteen pesticides were detected, with permethrin being detected the most frequently (>70% samples), which can be explained by the use of permethrin-based Permeicide 50 EC for dengue fever control during the sampling period. Endocrine-disrupting chemicals (i.e., bisphenol A, 4-nitrophenol) and pharmaceuticals and personal care products (diethyltoluamide, caffeine) were detected in over 90% of the samples. Seven sterols, five phthalate compounds and five organophosphorus flame retardants were detected in the samples. This is the first

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comprehensive survey of SVOCs adsorbed on atmospheric particulate matter in Vietnam, and as such, this study provides important new information about the frequency and concentrations of atmospheric SVOC contamination. The variety of chemicals detected in this study implies an abundance of pollution sources; further investigations to determine these pollution sources and the risks posed by the detected SVOCs to human health are warranted.

Authors: Duong HT, Kadokami K, Trinh HT, Phan TQ, Le GT, Nguyen DT, Nguyen TT, Nguyen DT.

Full Source: Chemosphere. 2019 Mar; 219:784-795. doi: 10.1016/j.chemosphere.2018.12.096. Epub 2018 Dec 12.

The impact of wipe sampling variables on method performance associated with indoor pesticide misuse and highly contaminated areas

2019-05-06

Pesticide misuse incidents in residential indoor areas are typically associated with misapplications that are inconsistent with the label directions of the product. Surface wipe sampling and analysis procedures are relied upon to evaluate the extent of indoor contamination and the remediation efforts successfully. In general, surface wipe sampling procedures are widely varied, which can complicate the comparison of the results and data interpretation. Wipe sampling parameters were studied for the insecticide's malathion and carbaryl. The parameters evaluated include wipe media, wetting solvents, composite sampling, surface concentration, and the influence of differing product formulations. Porous and nonporous surfaces tested include vinyl tile, plywood and painted drywall (porous/permeable) and stainless steel and glass (nonporous/impermeable). Specific wipe materials included pre-packaged sterile-cotton gauze, pre-cleaned cotton twill, cotton balls, and a pre-packaged, pre-wetted wipe. Commercially available insecticide formulations were tested, and the results were compared to surfaces fortified with neat analytes to determine surface recovery results (efficiency). A sampling procedure to measure pesticide residues was developed, and variables associated with the sampling methods were evaluated to clarify how estimations of surface residues are impacted. Malathion recoveries were 73-86% for twill and pre-wetted, pre-packaged isopropanol wipes on nonporous materials. Malathion formulations ranged from 78 to 124% for pre-wetted, pre-packaged isopropanol wipes and cotton gauze wipes on nonporous materials. Carbaryl and carbaryl formulation recoveries were 82-115% and 77-110%, respectively, on nonporous surfaces for all tested

Surface wipe sampling and analysis procedures are relied upon to evaluate the extent of indoor contamination and the remediation efforts successfully.

wipe materials. While not every wipe sampling variable could be tested, the collected information from this study may be useful and applied to sampling plans for classes of chemicals with similar physicochemical properties.

Authors: Willison SA, Daniel Stout II, Mysz A, Starr J, Tabor D, Wyrzykowska-Ceradini B, Nardin J, Morris E, Snyder EG.

Full Source: Science of the Total Environment. 2019 Mar 10; 655:539-546.

doi: 10.1016/j.scitotenv.2018.11.128. Epub 2018 Nov 19.

Body burden of organohalogenated pollutants and polycyclic aromatic hydrocarbons in Romanian population: Influence of age, gender, body mass index, and habitat

2019-05-06

Persistent organochlorine pollutants (POPs) are highly lipophilic and resistant to degradation, hence these substances are commonly found in the environment even decades after their prohibition. The aim of the present study was to determine human serum concentrations of POPs and polycyclic aromatic hydrocarbons (PAHs) in the Romanian population, investigating the role of demographic variables on the body burden of such chemicals. A cross-sectional study including a total of 121 subjects from Brasov (Transylvania region) was designed. The concentration of 62 chemicals, including organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (BDEs) and PAHs, was measured by gas chromatography-mass spectrometry (GC-MS) in the serum of the participants. p,p'-DDE and β -HCH were detected in 100% and 62% of the series (median values = 2.1 and 0.5 $\mu\text{g/L}$); PCB-153 was detected in 77.7% of the subjects and PCB-28 showed the highest median concentration (0.5 $\mu\text{g/L}$); BDE-47 was detected at a low concentration in 11.6% of the individuals; phenanthrene and naphthalene were present in 98.3% and 38.8% of the serum samples (median values = 0.9 and 6.5 $\mu\text{g/L}$, respectively). Age was the main determinant of the total body burden of OCPs and PCBs. A positive correlation was observed between p,p'-DDE and age (Spearman Rho = 0.312, $P < 0.0001$), suggesting the prevalence of higher levels of pollutants at older ages. The present results showed a significant decrease in serum levels of p,p'-DDE and HCH in Romania -a country which has traditionally reported higher values than other Eastern European countries- as well as low levels of PCBs and BDEs. The presence

The aim of the present study was to determine human serum concentrations of POPs and polycyclic aromatic hydrocarbons (PAHs) in the Romanian population, investigating the role of demographic variables on the body burden of such chemicals.

of PAHs suggests an unknown source of exposure that deserves further investigation.

Authors: Luzardo OP, Badea M, Zumbado M, Rogozea L, Floroian L, Ilea A, Moga M, Sechel G, Boada LD, Henríquez-Hernández LA.

Full Source: Science of the Total Environment. 2019 Mar 15; 656:709-716.

doi: 10.1016/j.scitotenv.2018.11.404. Epub 2018 Nov 29.

Factors influencing appropriate management of household hazardous waste in Nakhon Nayok, Thailand: A multilevel analysis

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Household hazardous products contain hazardous chemicals, so when discarding these products, a household hazardous waste (HHW) stream is created. HHW is a major environmental problem in Thailand, yet HHW has received scant attention so management is often inadequate or inappropriate. The objective of this study was to investigate the factors associated with appropriate HHW management in Thailand. Data were collected using a structured questionnaire completed during randomly assigned household interviews in Nakhon Nayok province, Thailand, between February and May 2017. The proportion of "appropriate management" was presented as percentage with its 95% confidence interval (CI). A multilevel mixed-effects logistic regression model was performed to determine the factors associated with appropriate HHW management, with 663 households included. The proportion of appropriate HHW management was 23.4% (95%CI: 20.2% to 26.6%). Both individual and local government administrative organization factors had an effect on appropriate HHW management, including (a) being female (adjusted odds ratio [OR]:1.59; 95%CI: 1.03 to 2.46); (b) household size (adjusted OR: 1.66; 95%CI: 1.09 to 2.54); (c) knowledge score vis-à-vis HHW management (adjusted OR: 1.78; 95%CI: 1.43 to 2.02); (d) appropriate HHW storage behaviour (adjusted OR: 2.48; 95%CI: 1.60 to 3.83); and (e) appropriate HHW use behaviour (adjusted OR: 3.97; 95%CI: 2.40 to 6.58). The government of Thailand might consider a program to increase appropriate management of household hazardous waste to mitigate public health and environmental contamination risks. Implications: Household hazardous waste becomes a major concern in many countries, including Thailand. The household hazardous waste management should be started at the source first, because household hazardous waste is mixed with the municipal waste stream. Thus, this study finding will be important for policymakers such as government and local government and can be

The objective of this study was to investigate the factors associated with appropriate household hazardous waste management in Thailand.

used to create a specific policy and campaigns for household hazardous waste management.

Authors: Intarasaksit P, Pitaksanurat S.

Full Source: Journal of the Air & Waste Management Association. 2019 Mar;69(3):313-319. doi: 10.1080/10962247.2018.1536616. Epub 2018 Nov 29.

Smoking, Smoking Cessation, and the Risk of Hearing Loss: Japan Epidemiology Collaboration on Occupational Health Study

2019-05-06

The authors aimed to determine the prospective association of smoking status, smoking intensity, and smoking cessation with the risk of hearing loss in a large Japanese cohort. The cohort study included 50195 employees, who were aged 20-64 years and free of hearing loss at baseline. Participants were followed up for a maximum of 8 years. Pure-tone audiometric testing was performed annually to identify hearing loss at 1 and 4 kHz. Cox proportional hazards regression models were used to investigate the association between smoking and hearing loss. During follow-up, 3532 individuals developed high-frequency hearing loss, and 1575 developed low-frequency hearing loss. The hazard ratio (HR) associated with current smokers was 1.6 (95% confidence interval [CI] = 1.5 to 1.7) and 1.2 (95% CI = 1.1 to 1.4) for high- and low-frequency hearing loss, respectively, as compared with never smokers. The risk of high- and low-frequency hearing loss increased with the number of cigarettes smoked per day (both p for trend <.001). The HR associated with former smokers was 1.2 (95% CI = 1.1 to 1.3) and 0.9 (95% CI = 0.8 to 1.1) for high- and low-frequency hearing loss, respectively. The analysis by quitting years showed a decline in risk of hearing loss after quitting smoking, even among those who quit less than 5 years before baseline. Smoking is associated with increased risk of hearing loss, especially at the high frequency, in a dose-response manner. The excess risk of hearing loss associated with smoking disappears in a relatively short period after quitting. The prospective association between smoking and hearing loss has not been well studied. To the best of our knowledge, our study is the largest to date investigating the association between smoking and incident hearing loss. These results indicate that smoking is associated with increased risk of hearing loss in a dose-response manner. Quitting smoking virtually eliminates the excess risk of hearing loss, even among quitters with short duration of cessation. These results suggest that smoking may be a causal factor for hearing loss, although further research

The authors aimed to determine the prospective association of smoking status, smoking intensity, and smoking cessation with the risk of hearing loss in a large Japanese cohort.

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would be required to confirm this. If so, this would emphasise the need for tobacco control to prevent or delay the development of hearing loss.

Authors: Hu H, Sasaki N, Ogasawara T, Nagahama S, Akter S, Kuwahara K, Kochi T, Eguchi M, Kashino I, Murakami T, Shimizu M, Uehara A, Yamamoto M, Nakagawa T, Honda T, Yamamoto S, Hori A, Nishiura C, Okazaki H, Imai T, Nishihara A, Miyamoto T, Tomita K, Kabe I, Mizoue T, Kunugita N, Dohi S; Japan Epidemiology Collaboration on Occupational Health Study Group.
Full Source: Nicotine Tobacco Research. 2019 Mar 30;21(4):481-488. doi: 10.1093/ntr/nty026.