

Contents

CHEMWATCH

(click on page numbers for links)

ENVIRONMENTAL RESEARCH

Antibiotic Use on Goat Farms: An Investigation of Knowledge, Attitudes, and Behaviours of Missouri Goat Farmers	3
Monsanto, PCBs, and the creation of a "world-wide ecological problem"	3
A fugacity model assessment of ibuprofen, diclofenac, carbamazepine, and their transformation product concentrations in an aquatic environment.....	4
Macrolides induce severe cardiotoxicity and developmental toxicity in zebrafish embryos.....	5
Cytological Effects of Bleaching Agent (Quneex) on Plant Cells and Plant DNA.....	6

MEDICAL RESEARCH

Bidirectional Association between Non-alcoholic Fatty Liver Disease and Gallstone Disease: A Cohort Study.....	7
Synthesis and Biological Evaluation of Phaeosphaeride A Derivatives as Antitumor Agents.....	8
Video-based kinetic analysis of calcification in live osteogenic human embryonic stem cell cultures reveals the developmentally toxic effect of Snus tobacco extract	8
UK clinical experience up to 52 weeks with linaclotide for irritable bowel syndrome with constipation.....	9
BET bromodomain inhibitor birabresib in mantle cell lymphoma: in vivo activity and identification of novel combinations to overcome adaptive resistance.....	10

OCCUPATIONAL RESEARCH

Colorimetric Detection of Carcinogenic Alkylating Fumigants on Nylon-6 Nanofibrous Membrane. Part I: Investigation of 4-(p-Nitrobenzyl) Pyridine as A "New" Sensing Agent with Ultra-High Sensitivity.....	11
The reproducibility of urinary ions in manganese exposed workers.....	11
Occupational manganese exposure, reproductive hormones, and semen quality in male workers: A cross-sectional study	12
Monitoring early cell damage in physicians who are occupationally exposed to inhalational anaesthetics	13

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Contents

CHEMWATCH

Surgical smoke: still an underestimated health hazard in the operating theatre14

PUBLIC HEALTH RESEARCH

Outdoor air pollution pregnancy exposures are associated with behavioural problems in China's pre-schoolers15

Domestic Exposures to Polycyclic Aromatic Hydrocarbons in a Houston, Texas, Environmental Justice Neighbourhood16

Overview of known plastic packaging-associated chemicals and their hazards16

Profiles, variability, and predictors of urinary benzotriazoles and benzothiazoles in pregnant women from Wuhan, China17

Different exposure profile of heavy metal and health risk between residents near a Pb-Zn mine and a Mn mine in Huayuan county, South China19

Technical

CHEMWATCH

ENVIRONMENTAL RESEARCH

Antibiotic Use on Goat Farms: An Investigation of Knowledge, Attitudes, and Behaviours of Missouri Goat Farmers

2019-01-30

Use of low dose, prophylactic antibiotics contributes to the emergence of antibiotic resistant bacteria. In one study, goat meat in Missouri was found to have a higher percentage of antibiotic residues at slaughter than the national average, so the authors attempted to identify factors related to goat production that may contribute to this issue. Using the knowledge, attitude, and behaviour (KAB) model, 11 Missouri goat farmers were interviewed about factors affecting antibiotic use. Most of the farmers did not have specific protocols for managing illnesses and only relied on veterinarians for major health issues. Many felt veterinarians lacked knowledge about goat medicine so instead relied on other farmers' or their own experiences for treatment modalities. While most agreed that antibiotic resistance was a concern, only 4 of the 11 indicated that they only used antibiotics when prescribed by the veterinarian. Veterinarians should be relied on and valued for their medical expertise, but they are not always being utilised in this manner. Therefore, veterinary education should emphasise goat health management to a greater extent than it currently does, and soft skills to build collaborative relationships with farmers should be taught to promote preventative health measures and more judicious use of antibiotics.

Authors: K Landfried L, K Barnidge E, Pithua P, D Lewis R, A Jacoby J, C King C, R Baskin C.

Full Source: *Animals (Basel)*. 2018 Nov 6; 8(11). pii: E198. doi: 10.3390/ani8110198.

Monsanto, PCBs, and the creation of a "world-wide ecological problem"

2019-01-30

For the past three decades, we have written on the history of occupational and environmental health, authoring books and articles on lead poisoning, silicosis, asbestosis, and angiosarcoma of the liver, among other diseases. One book, *Deceit and Denial*, focused specifically on the chemical and lead industries. Because of the rarity of historians who study this history, we have been asked to testify on behalf of workers who allege harm from these industrial materials and by state, county, and local

In this study, goat meat in Missouri was found to have a higher percentage of antibiotic residues at slaughter than the national average, so the authors attempted to identify factors related to goat production that may contribute to this issue.

governments who seek redress for environmental damages and funds to prevent future harm to children. In about 2010, we began testifying in law suits brought by individuals who claimed that they had suffered from cancers, specifically non-Hodgkin's lymphoma, because of polychlorinated biphenyls (PCBs) in their bodies. At that time, we wrote a Report to the Court about industry knowledge of the dangers of PCBs to workers and the environment. More recently, we have been approached by attorneys representing government agencies on the West Coast of the United States which are seeking funds to abate PCB pollution in their ports, bays, and waterways. The focus of these lawsuits is the Monsanto Corporation, the sole producer of PCBs in the United States from the 1930s through 1977. Through these law suits, an enormous trove of previously private Monsanto reports, papers, memos, letters, and studies have been made available to us and this paper is the result of our examination of these hundreds of thousands of pages. The documents from this collection (with the exception of privileged materials that Monsanto has not made public, and upon which we have not relied) are available on www.ToxicDocs.org, the website we have developed with Professor Merlin Chowkwanyun of Columbia's Mailman School of Public Health. (Almost all of the references that are from this collection can be accessed by readers by clicking on the reference hyperlink.) This monograph is adapted from a report to the court that was originally produced for litigation on behalf of plaintiffs in PCB lawsuits. We are grateful to the Journal of Public Health Policy for publishing this detailed examination of these documents and we hope it will stimulate further research into this important, and now public, archive of industry records.

Authors: Markowitz G, Rosner D.

Full Source: Journal of Public Health Policy. 2018 Nov; 39(4):463-540. doi: 10.1057/s41271-018-0146-8.

A fugacity model assessment of ibuprofen, diclofenac, carbamazepine, and their transformation product concentrations in an aquatic environment

2019-01-30

An updated version of FATEMOD, a multimedia fugacity model for environmental fate of organic chemicals, was set up to assess environmental behaviour of three pharmaceuticals in northern Lake Päijänne, Finland. Concentrations of ibuprofen, diclofenac, and carbamazepine were estimated at various depths at two sites: near a wastewater treatment plant and 3.5 km downstream the plant. When compared with environmental sampling data from corresponding depths

An updated version of FATEMOD, a multimedia fugacity model for environmental fate of organic chemicals, was set up to assess environmental behaviour of three pharmaceuticals in northern Lake Päijänne, Finland.

and sites, the predicted concentrations, ranging from nanograms to hundreds of nanograms per litre, were found to be in good agreement. Weather data were utilised with the model to rationalise the effects of various environmental parameters on the sampling results, and, e.g. the roles of various properties of lake dynamics and photodegradation were identified. The new model also enables simultaneous assessment of transformation products. Environmentally formed transformation product concentrations were estimated to be at highest an order of magnitude lower than those of the parent compounds, and unlikely to reach a detectable level. However, a possibility that conjugates of ibuprofen are present at higher levels than the parent compound was identified. Simulation results suggest that environmental degradation half-lives of the inspected contaminants under stratified lake conditions are in the range of some weeks to months.

Authors: Nurmi TMA, Kiljunen TK, Knuutinen JS.

Full Source: Environmental Science & Pollution Research International.

2018 Nov 5. doi: 10.1007/s11356-018-3485-x. [Epub ahead of print]

Macrolides induce severe cardiotoxicity and developmental toxicity in zebrafish embryos

2019-01-30

Macrolide antibiotics (MALs) are widely used for both human and animal health. Most MALs and their metabolites transfer into aquatic organisms and environment resulting in violent consequences. Previous studies show that MALs cause cardiotoxicity in humans and mammals. However, the potential risk of these chemicals in aquatic organisms remains unclear. In the present study, the researchers used zebrafish embryos as a model to evaluate the toxicity of MALs. Zebrafish embryos were exposed to four typical MALs including azithromycin (AZM), clarithromycin (CLR), tilmicosin (TMS) and tylosin (TYL) to study their cardiotoxicity. The heart rate of zebrafish embryos showed similar biphasic distribution in the presence of four MALs at 2 days post-fertilization (dpf). The heart rate increased significantly at low levels of MALs while decreased obviously at high levels. Subsequently, TMS was chosen to study its acute toxicity and developmental toxicity, which caused pericardial oedema and spinal curvature in zebrafish embryos at 4 dpf. Furthermore, we found that TMS triggered oxidative stress, with decreased SOD activities and increased MDA contents. Lastly, apoptosis was observed in zebrafish embryos under TMS treatment, with up-regulation of apoptosis associated genes such as p53, bcl 2, bax, caspase 3 and caspase 9, confirmed by increased protein expression based on Western blot analysis. Taken together, these

In the present study, the researchers used zebrafish embryos as a model to evaluate the toxicity of macrolide antibiotics

data indicate that MALs can cause serious toxicity in the development of zebrafish. Great caution should be taken due to the huge consumption of MALs for food animal production and treatments with TMS for infections in aquaculture.

Authors: Yan Z, Huang X, Xie Y, Song M, Zhu K, Ding S.

Full Source: Science of the Total Environment. 2019 Feb 1; 649:1414-1421.

doi: 10.1016/j.scitotenv.2018.07.432. Epub 2018 Aug 21.

Cytological Effects of Bleaching Agent (Quneex) on Plant Cells and Plant DNA

2019-01-30

There have been a number of reported drawbacks and efficacy issues regarding the use of bleaching agents in the plant industry. This study was conducted to determine the cytological effects of the bleaching agent (Quneex) on the plant cells and plant DNA using the *Allium cepa* assay. In the study, sixteen root meristems of *A. cepa* were subjected to different concentrations of the bleaching agent (0.1, 0.2, 0.3, 0.4 and 0.5%) with different periods of time (6, 12 and 24 h). Recovery was done for 6, 12 and 24 h after exposure. The mitotic index significantly decreased with time and also decreased with increase in the concentration of the bleaching agent. Abnormal chromosomal changes reflecting mutagenesis including stickiness, laggards, bridges, C-metaphase, star-metaphase, binucleation, polyploidy, disturbance and multinucleation were observed in the different concentrations and periods of time. After recovery, a slow increase in the mitotic index was observed. All treatments with or without recovery for 12 and 24 h resulted in reduction in the amount of DNA. Bleaching agents similar to Quneex containing sodium hypochlorite have mutagenic properties that can be potentially hazardous to the environment and also to humans. Thus, there is a need to regulate the use and disposal of such chemicals into the environment particularly to the sewers, to prevent contamination of potable water, plant and biodiverse aquatic animals.

Author: I Algwaiz H.

Full Source: Pakistan Journal of Biological Sciences. 2018 Jan; 21(5):205-214. doi: 10.3923/pjbs.2018.205.214.

This study was conducted to determine the cytological effects of the bleaching agent (Quneex) on the plant cells and plant DNA using the *Allium cepa* assay.

MEDICAL RESEARCH

Bidirectional Association between Non-alcoholic Fatty Liver Disease and Gallstone Disease: A Cohort Study

2019-01-30

Non-alcoholic fatty liver disease (NAFLD) and gallstone disease (GD) are often found to coexist but the sequential relationship of NAFLD and GD to each other remains controversial. The authors prospectively evaluated the bidirectional relationship of non-alcoholic fatty liver disease with gallstone disease. A cohort study was performed on Korean adults who underwent a health check-up and were followed annually or biennially for a mean of 6.0 years. Fatty liver and gallstones were diagnosed by ultrasound. NAFLD was defined as hepatic steatosis on ultrasonography in the absence of excessive alcohol use or other identifiable causes. The NAFLD severity was determined by non-invasive fibrosis markers. Among 283,446 participants without either gallstones or cholecystectomy at baseline, 6440 participants developed gallstones. Among 219,641 participants without NAFLD at baseline, 49,301 participants developed NAFLD. The multivariable-adjusted hazard ratio (95% confidence interval) for incident gallstone comparing the NAFLD group vs. the non-NAFLD group was 1.26 (1.17 1.35). Increased non-invasive fibrosis markers of NAFLD were positively associated with an increased incidence of gallstones in a graded and dose-responsive manner (p -trend < 0.01). The multivariable-adjusted hazard ratios (95% confidence intervals) for incident NAFLD comparing gallstone and cholecystectomy to no GD were 1.14 (1.07 1.22) and 1.17 (1.03 1.33), respectively. This large-scale cohort study of young and middle-aged individuals demonstrated a bidirectional association between NAFLD and GD. NAFLD and its severity were independently associated with an increased incidence of gallstones, while GD and cholecystectomy were also associated with incident NAFLD. The findings indicate that the conditions may affect each other, requiring further studies to elucidate the potential mechanisms underlying this association. Authors: Chang Y, Noh YH, Suh BS, Kim Y, Sung E, Jung HS, Kim CW, Kwon MJ, Yun KE, Noh JW, Shin H, Cho YK, Ryu S. Full Source: Journal of Clinical Medicine. 2018 Nov 21;7(11). pii: E458. doi: 10.3390/jcm7110458.

The authors prospectively evaluated the bidirectional relationship of NAFLD with GD.

Synthesis and Biological Evaluation of Phaeosphaeride A Derivatives as Antitumor Agents

2019-01-30

Anti-tumour activity studies were carried out on the HCT-116, PC3, MCF-7, A549, K562, NCI-H929, Jurkat, THP-1, RPMI8228 tumour cell lines, and on the HEF cell line. All of the compounds synthesized were found to have better efficacy than PPA towards the tumour cell lines mentioned. Compound 6 was potent against six cancer cell lines, HCT-116, PC-3, K562, NCI-H929, Jurkat, and RPMI8226, showing a 47, 13.5, 16, 4, 1.5, and 7-fold increase in anticancer activity comparative to those of etoposide, respectively. Compound 1 possessed selectivity toward the NCI-H929 cell line ($IC_{50} = 1.35 \pm 0.69 \mu M$), while product 7 was selective against three cancer cell lines, HCT-116, MCF-7, and NCI-H929, each having IC_{50} values of 1.65 μM , 1.80 μM and 2.00 μM , respectively.

Authors: Abzianidze V, Beltyukov P, Zakharenkova S, Moiseeva N, Mejia J, Holder A, Trishin Y, Berestetskiy A, Kuznetsov V.

Full Source: *Molecules*. 2018 Nov 21;23(11). pii: E3043. doi: 10.3390/molecules23113043.

Video-based kinetic analysis of calcification in live osteogenic human embryonic stem cell cultures reveals the developmentally toxic effect of Snus tobacco extract

2019-01-30

Epidemiological studies suggest tobacco consumption as a probable environmental factor for a variety of congenital anomalies, including low bone mass and increased fracture risk. Despite intensive public health initiatives to publicise the detrimental effects of tobacco use during pregnancy, approximately 10-20% of women in the United States still consume tobacco during pregnancy, some opting for so-called harm-reduction tobacco. These include Snus, a type of orally-consumed yet spit-free chewing tobacco, which is purported to expose users to fewer harmful chemicals. Concerns remain from a developmental health perspective since Snus has not reduced overall health risk to consumers and virtually nothing is known about whether skeletal problems from intrauterine exposure arise in the embryo. Utilising a newly developed video-based calcification assay the authors determined that extracts from Snus tobacco hindered calcification of osteoblasts derived from pluripotent stem cells early on in their differentiation. Nicotine, a major component of tobacco products, had no measurable effect in the tested concentration range. However, through the extraction of video data, the authors determined

Utilising a newly developed video-based calcification assay the authors determined that extracts from Snus tobacco hindered calcification of osteoblasts derived from pluripotent stem cells early on in their differentiation.

that the tobacco-specific nitrosamine N'-nitrosonornicotine caused a reduction in calcification with similar kinetics as the complete Snus extract. From measurements of actual nitrosamine concentrations in Snus tobacco extract we furthermore conclude that N'-nitrosonornicotine has the potential to be a major trigger of developmental osteotoxicity caused by Snus tobacco.

Authors: Martinez IKC, Sparks NRL, Madrid JV, Affeldt H 3rd, Vera MKM, Bhanu B, Zur Nieden NI.

Full Source: Toxicology & Applied Pharmacology. 2018 Nov 20. pii: S0041-008X(18)30509-X. doi: 10.1016/j.taap.2018.11.006. [Epub ahead of print]

UK clinical experience up to 52 weeks with linaclotide for irritable bowel syndrome with constipation

2019-01-30

Linaclotide, a guanylate cyclase C agonist, has been shown in clinical trials to improve symptoms of irritable bowel syndrome with constipation (IBS-C). In this study, data from a real-world study of linaclotide in the UK are reported. This 1-year, multicentre, prospective, observational study in the UK enrolled patients aged 18 years and over initiating linaclotide for IBS-C. The primary assessment was change from baseline in IBS Symptom Severity Scale (IBS-SSS) score at 12 weeks, assessed in patients with paired baseline and 12-week data. Change from baseline in IBS-SSS score at 52 weeks was a secondary assessment. Adverse events were recorded. In total, 202 patients were enrolled: 185 (91.6%) were female, median age was 44.9 years (range 18.1-77.2) and 84 (41.6%) reported baseline laxative use. Mean (standard deviation) baseline IBS-SSS score was 339 (92), with most patients (n = 129; 66.8%) classified as having severe disease (score ≥ 300). In patients with paired data, there was a significant mean (95% confidence interval) decrease in IBS-SSS score from baseline to 12 weeks [-77.0 (-96.3, -57.7); $p < 0.001$; n = 124] and baseline to 52 weeks [-70.7 (-95.0, -46.5); $p < 0.001$; n = 76]. Overall, 174 adverse events were reported in 77 (38.1%) patients, most commonly diarrhoea (n = 54; 26.7%), abdominal pain (n = 21; 10.4%) and abdominal distension (n = 13; 6.4%). The authors concluded that Linaclotide significantly improved IBS-SSS score at 12 and 52 weeks. These results provide insights into outcomes

Linaclotide, a guanylate cyclase C agonist, has been shown in clinical trials to improve symptoms of irritable bowel syndrome with constipation (IBS-C).

with linaclotide treatment over 1 year in patients with IBS-C in real-world clinical practice.

Authors: Yiannakou Y, Agrawal A, Allen PB, Arebi N, Brown SR, Eugenicos MP, Farmer AD, McLain-Smith S, McLaughlin J, Sanders DS, Lawrance D, Emmanuel A.

Full Source: Therapeutic advances in gastroenterology. 2018 Oct 3; 11:1756284818798791. doi: 10.1177/1756284818798791. eCollection 2018.

BET bromodomain inhibitor birabresib in mantle cell lymphoma: in vivo activity and identification of novel combinations to overcome adaptive resistance

2019-01-30

The outcome of patients affected by mantle cell lymphoma (MCL) has improved in recent years, but there is still a need for novel treatment strategies for these patients. Human cancers, including MCL, present recurrent alterations in genes that encode transcription machinery proteins and of proteins involved in regulating chromatin structure, providing the rationale to pharmacologically target epigenetic proteins. The Bromodomain and Extra Terminal domain (BET) family proteins act as transcriptional regulators of key signalling pathways including those sustaining cell viability. Birabresib (MK-8628/OTX015) has shown anti-tumour activity in different preclinical models and has been the first BET inhibitor to successfully undergo early clinical trials. The activity of birabresib as a single agent and in combination, as well as its mechanism of action was studied in MCL cell lines. Birabresib showed in vitro and in vivo activities, which appeared mediated via downregulation of MYC targets, cell cycle and NFκB pathway genes and were independent of direct downregulation of CCND1. Additionally, the combination of birabresib with other targeted agents (especially pomalidomide, or inhibitors of BTK, mTOR and ATR) was beneficial in MCL cell lines. The authors concluded that the data provide the rationale to evaluate birabresib in patients affected by MCL.

Authors: Tarantelli C, Bernasconi E, Gaudio E, Cascione L, Restelli V, Arribas AJ, Spriano F, Rinaldi A, Mensah AA, Kwee I, Ponzoni M M.D, Zucca E, Carrassa L, Riveiro ME, Rezai K, Stathis A, Cvitkovic E, Bertoni F.

Full Source: ESMO Open. 2018 Sep 26;3(6): e000387. doi: 10.1136/esmoopen-2018-000387. eCollection 2018.

Alkylating fumigants are widely used in agricultural production for the control of soil-borne pests, but the acute toxicity and carcinogenicity of these chemicals pose a health threat to farm workers as well as residents.

OCCUPATIONAL RESEARCH

Colorimetric Detection of Carcinogenic Alkylating Fumigants on Nylon-6 Nanofibrous Membrane. Part I: Investigation of 4-(p-Nitrobenzyl) Pyridine as A "New" Sensing Agent with Ultra-High Sensitivity.

2019-01-30

Alkylating fumigants are widely used in agricultural production for the control of soil-borne pests, but the acute toxicity and carcinogenicity of these chemicals pose a health threat to farm workers as well as residents. A nanofibrous membrane-based colorimetric sensor relying on the nucleophilic substitution reaction of 4-(p-nitrobenzyl) pyridine (NBP) is introduced for the convenient and portable detection of alkylating fumigants. Comparing with the traditional use of NBP in detecting alkylating agents, this sensor system achieves a ppb-level detection sensitivity toward alkylating fumigant gases without a high-temperature incubation or the addition of extra bases. The mechanisms of the detection reaction and the detection sensitivities of different fumigants were studied with computational methods, and the results comprehensively prove the proposed optimised detection mechanisms. The detection limit of methyl iodide, methyl bromide, and 1, 3-dichloropropene successfully reaches to the limiting exposure concentrations (PEL or REL) with a naked-eye detectable colour difference within 5 min with a dynamic detection procedure. The designed sensing system is promising for a real-time monitoring of the air quality related to alkylating fumigants in the environment, especially in agricultural and industrial areas.

Authors: Tang P, Sun G, Leung HT.

Full Source: Analytical Chemistry. 2018 Nov 23. doi: 10.1021/acs.analchem.8b04775. [Epub ahead of print]

The reproducibility of urinary ions in manganese exposed workers

2019-01-30

Manganese (Mn) is found in environmental and occupational settings, and can cause cognitive and motor impairment. Existing Mn exposure studies have not reached consensus on a valid and reproducible biomarker for Mn exposure. Previously, global metabolomics data was generated from urine collected in October 2014 using mass spectrometry (MS). Nine ions were found to be different between persons exposed and unexposed to

Mn occupationally, though their identity was not able to be determined. In the present study. The authors investigated these nine ions in a follow-up set of urine samples taken from the same cohort in January 2015, and in urine samples from a separate Mn-exposed cohort from Wisconsin. An elastic net model was fitted using the nine ions found in the October 2014 data. The elastic net correctly predicted exposure status in 72% of the follow-up samples collected in January 2015, and the area under the curve of the receiver operating characteristic (ROC) curve was 0.8. In the Wisconsin samples, the elastic net performed no better than chance in predicting exposure, possibly due to differences in Mn exposure levels, or unmeasured occupational or environmental co-exposures. This study underscores the importance of taking repeat samples for replication studies when investigating the human urine metabolome, as both within- and between-person variances were observed. Validating and identifying promising results remains a challenge in harnessing global metabolomics for biomarker discovery in occupational cohorts.

Authors: Baker MG, Lin YS, Simpson CD, Shireman LM, Searles Nielsen S, Racette BA, Seixas N.

Full Source: Journal of Trace Elements & Medical Biology. 2019 Jan; 51:204-211. doi: 10.1016/j.jtemb.2018.11.001. Epub 2018 Nov 3.

Occupational manganese exposure, reproductive hormones, and semen quality in male workers: A cross-sectional study

2019-01-30

It has been found that exposure to manganese (Mn) could induce reproductive dysfunction, but its occupational risk in male workers is unclear. This study aims to assess the association of occupational Mn exposure with reproductive hormones and semen quality in a cross-sectional study. Urinary Mn, semen quality, and reproductive hormones were explored in 84 male workers occupationally exposed to Mn and 92 referents. Multiple linear regression analyses were used to assess the relationship. Urinary Mn levels in Mn-exposed workers ranged from 0.56 to 34.25 $\mu\text{g/L}$, and the average level was $15.92 \pm 8.49 \mu\text{g/L}$. Compared with the control group, gonadotropin-releasing hormone (GnRH) levels and luteinising hormone (LH) levels increased significantly and the levels of testosterone (TSTO) decreased significantly in the Mn-exposed group. There was a significant positive linear association between urinary Mn and GnRH and LH, while the linear association between urinary Mn and TSTO was negative. Sperm progressive motility and total motility decreased significantly in the Mn-exposed group. There was a significantly negative

This study aims to assess the association of occupational Mn exposure with reproductive hormones and semen quality in a cross-sectional study.

linear association between urinary Mn and sperm progressive motility and total motility. In conclusion, occupational Mn exposure was inversely associated with reproductive health of male workers, resulting in the abnormality of hormones secretion and decrease of sperm motility.

Authors: Yang H, Wang J, Yang X, Wu F, Qi Z, Xu B, Liu W, Deng Y.

Full Source: Toxicology & Industrial Health. 2018 Nov 22:748233718810109.

doi: 10.1177/0748233718810109. [Epub ahead of print]

Monitoring early cell damage in physicians who are occupationally exposed to inhalational anaesthetics

2019-01-30

Worldwide, millions of professionals who work in operating rooms are occupationally exposed to inhalational anaesthetics. Thus, the potential health effects of the continuous exposure to inhalational anaesthetics on individuals in the operating room remain a subject of debate. Human biomonitoring is a potentially useful tool for assessing the health of exposed professionals. No report has yet evaluated the possible cytotoxic and genotoxic effects of the most commonly used inhalational anaesthetics on young professionals who are occupationally exposed. Considering the importance of this issue, the authors monitored physicians who were exposed to inhalational anaesthetics during their first year of a medical residency program to evaluate the possible early damage events. Twenty-six young physicians who had been occupationally exposed to the anaesthetic's isoflurane, sevoflurane, desflurane, and nitrous oxide and who worked in operating rooms using modern anaesthesia workstations during their medical residency program, participated in this study. Blood samples were evaluated before the start of the program (before the exposure), and after 1/2 year and 1 year of exposure. We monitored the subjects by assessing the cytotoxicity (early apoptosis and loss of the mitochondrial membrane potential) using flow cytometry and genotoxicity using the comet assay. No significant changes were observed in the biomarkers of cytotoxicity or genotoxicity ($p > 0.05$). Thus, biomonitoring showed that short-term exposure to inhalational anaesthetics did not induce early cell damage during the first year of medical residency. Based on the results, brief occupational exposure to anaesthetics does not induce either cytotoxicity or genotoxicity in mononuclear cells under the conditions of this study. Thus, young physicians should undergo additional biomonitoring at the beginning of their careers to determine possible toxic effects on their cells and genetic material, and further investigations are warranted to determine whether

The authors monitored physicians who were exposed to inhalational anaesthetics during their first year of a medical residency program to evaluate the possible early damage events.

a longer exposure to inhalational anaesthetics results in mitochondrial depolarization, apoptosis and DNA breaks.

Authors: Aun AG, Golim MA, Nogueira FR, Souza KM, Arruda NM, Braz JRC, Braz LG, Braz MG.

Full Source: Mutation Research. 2018 Nov; 812:5-9. doi: 10.1016/j.mrfmmm.2018.10.002. Epub 2018 Oct 9.

Surgical smoke: still an underestimated health hazard in the operating theatre

2019-01-30

Smoke generated from electrocautery dissection contains irritating and/or carcinogenic components. The aim of this study was to investigate the effectiveness of a mobile smoke evacuation system (SES) in protecting surgical personnel from these hazardous fumes. Standardised cuts with an electrocautery device were performed on fresh porcine tissue, and the generated surgical fume was analysed with and without the additional use of a mobile SES using a real-time proton-transfer-reaction time-of-flight mass spectrometer. Furthermore, 2 different surgical masks were tested to investigate their filter capacity. Several toxic and/or carcinogenic volatile organic compounds including 1,3-butadiene, benzene and furfural were found in concentrations clearly above the limits that were set by the National Institute of Occupational Safety and Health: 1,3-butadiene at 19.06 ± 1.54 ppb (limit: 5 ppb), benzene at 6.21 ± 1.33 ppb (limit: 0.5 ppb) and furfural at 14.34 ± 2.97 ppb (limit: 2 ppb). Although the mobile SES was able to reduce these substances to a certain degree, butadiene and benzene still remained above the permissible exposure limits with concentrations of 14.21 ± 0.07 and 1.16 ± 0.05 , respectively. Both surgical masks were unable to reduce the 'inhaled' concentrations of volatile organic compounds. Although the SES reduced the concentrations of most of the detected volatile organic compounds to a certain amount, especially the carcinogenic substances, butadiene and benzene remained high above exposure limits. According to the abovementioned significant data, further investigation on this topic is imperative, especially when considering that surgical masks were absolutely ineffective in protecting individuals from the toxic smoke and that the cautery was only used for 10 s in this experiment.

Authors: Kocher GJ, Sesia SB, Lopez-Hilfiker F, Schmid RA.

Full Source: European Association for Cardio-Thoracic Surgery. 2018 Nov 2. doi: 10.1093/ejcts/ezy356. [Epub ahead of print]

The aim of this study was to investigate the effectiveness of a mobile smoke evacuation system (SES) in protecting surgical personnel from these hazardous fumes.

PUBLIC HEALTH RESEARCH

Outdoor air pollution pregnancy exposures are associated with behavioural problems in China's pre-schoolers

2019-01-30

There are mounting evidences indicated that maternal exposure to outdoor air pollutants in pregnancy affects children's neural development, but the researches on children's behavioural difficulties are seldom. In the present study, the authors explored the association between maternal exposure to outdoor air pollution during different trimesters of pregnancy and the prevalence of behavioural difficulties among 657 preschool children aged 3-4 from three kindergartens in Wuhan, China. This is a cross-sectional study. Children's behavioural difficulties were assessed by the Strengths and Difficulties Questionnaire (SDQ) (reported by parents). Maternal exposure to outdoor air pollutants during pregnancy were estimated based on the daily average measured concentration levels from ground monitoring stations. Potential confounding factors including children-related, maternal, and socio-economic status (SES) were adjusted in the study. The authors calculated the prevalence of each type of behavioural difficulties and used binary logistic regression method to estimate the crude odds ratio (cOR), adjusted odds ratio (aOR), and corresponding 95% confidence intervals (95% CIs) for 1 $\mu\text{g}/\text{m}^3$ increase in each air pollutant during every exposure window in single- and two-pollutant models. The prevalence of participants' total behavioural difficulties was 9.6%. In single-pollutant models, during full gestation, positive associations were observed between exposure to NO₂ (aOR= 1.204, 95% CI 1.042, 1.392), particle matter (PM)₁₀ (aOR= 1.070, 95% CI 1.018, 1.125), PM_{2.5} (aOR= 1.095, 95% CI 1.021, 1.176) and total difficulties, exposure to PM₁₀ (aOR= 1.040, 95% CI 1.001, 1.081), PM_{2.5} (aOR= 1.053, 95% CI 1.000, 1.109) and prosocial behaviour, respectively. In the first trimester, exposure to SO₂ (aOR= 1.047, 95% CI 1.009, 1.086), NO₂ (aOR= 1.039, 95% CI 1.013, 1.066), PM₁₀ (aOR= 1.013, 95% CI 1.004, 1.023), and PM_{2.5} (aOR= 1.016, 95% CI 1.004, 1.028) were all positively associated with total difficulties. The associations between second and third trimesters' exposure to all pollutants and outcomes were not statistically significant. However, in the two-pollutant models, second trimester exposure to PM_{2.5} (aOR= 1.078, 95%CI 1.023, 1.137) was positively associated with total behavioural difficulties after adjusting for PM₁₀. Exposure to outdoor air pollutants SO₂, NO₂, PM₁₀, and PM_{2.5} during

pregnancy may be associated with behavioural difficulties, especially in the first trimester.

Authors: Ren Y, Yao X, Liu Y, Liu S, Li X, Huang Q, Liu F, Li N, Lu Y, Yuan Z, Li S, Xiang H.

Full Source: Environmental Science & Pollution Research International. 2018 Nov 22. doi: 10.1007/s11356-018-3715-2. [Epub ahead of print]

Domestic Exposures to Polycyclic Aromatic Hydrocarbons in a Houston, Texas, Environmental Justice Neighbourhood

2019-01-30

Polycyclic aromatic hydrocarbons (PAHs) are a class of >100 chemicals that naturally occur in coal tar, crude oil, and gasoline and can be manufactured as part of dyes, plastics, and pesticides. PAHs are complex environmental toxicants and exposure to them have been linked to adverse health outcomes including cancer, as well as diseases of the skin, liver, and immune system. Residents of the environmental justice neighbourhood of Manchester, located on Houston's East End, are disproportionately exposed to toxic pollutants from both industry and transportation infrastructure. Based on a longstanding community engagement partnership with the research team, neighbourhood residents sought to better understand their domestic exposure to PAHs. Particulate wipes were used to collect dust from a marked area within the entryway of randomly selected homes to assess for the presence of PAHs. Nineteen of the 61 PAH analytes, including the Environmental Protection Administration's 16 priority PAHs and the subgroup of 7 probable human carcinogens, were found in the sampled homes. Residents of the Houston neighbourhood of Manchester potentially have significant domestic exposure to PAHs from combustion sources. More research is needed to assess the source of the PAHs and to better understand the potential health impacts of these exposures.

Authors: Sansom GT, Kirsch KR, Stone KW, McDonald TJ, Horney JA.

Full Source: Environmental Justice. 2018 Oct;11(5):183-191. doi: 10.1089/env.2018.0004. Epub 2018 Oct 16.

Overview of known plastic packaging-associated chemicals and their hazards

2019-01-30

Global plastics production has reached 380 million metric tons in 2015, with around 40% used for packaging. Plastic packaging is diverse and made of multiple polymers and numerous additives, along with other

In this study, the authors present a database of Chemicals associated with Plastic Packaging (CP-Pdb), which includes chemicals used during manufacturing and/or present in final packaging articles.

components, such as adhesives or coatings. Further, packaging can contain residues from substances used during manufacturing, such as solvents, along with non-intentionally added substances (NIAS), such as impurities, oligomers, or degradation products. To characterise risks from chemicals potentially released during manufacturing, use, disposal, and/or recycling of packaging, comprehensive information on all chemicals involved is needed. In this study, the authors present a database of Chemicals associated with Plastic Packaging (CPPdb), which includes chemicals used during manufacturing and/or present in final packaging articles. The CPPdb lists 906 chemicals likely associated with plastic packaging and 3377 substances that are possibly associated. Of the 906 chemicals likely associated with plastic packaging, 63 rank highest for human health hazards and 68 for environmental hazards according to the harmonised hazard classifications assigned by the European Chemicals Agency within the Classification, Labelling and Packaging (CLP) regulation implementing the United Nations' Globally Harmonized System (GHS). Further, 7 of the 906 substances are classified in the European Union as persistent, bioaccumulative, and toxic (PBT), or very persistent, very bioaccumulative (vPvB), and 15 as endocrine disrupting chemicals (EDC). Thirty-four of the 906 chemicals are also recognized as EDC or potential EDC in the recent EDC report by the United Nations Environment Programme. The identified hazardous chemicals are used in plastics as monomers, intermediates, solvents, surfactants, plasticisers, stabilisers, biocides, flame retardants, accelerators, and colorants, among other functions. This study was challenged by a lack of transparency and incompleteness of publicly available information on both the use and toxicity of numerous substances. The most hazardous chemicals identified here should be assessed in detail as potential candidates for substitution.

Authors: Groh KJ, Backhaus T, Carney-Almroth B, Geueke B, Inostroza PA, Lennquist A, Leslie HA, Maffini M, Slunge D, Trasande L, Warhurst AM, Muncke J.

Full Source: Science of the Total Environment. 2019 Feb 15;651(Pt 2):3253-3268. doi: 10.1016/j.scitotenv.2018.10.015. Epub 2018 Oct 4.

Profiles, variability, and predictors of urinary benzotriazoles and benzothiazoles in pregnant women from Wuhan, China

2019-01-30

Benzotriazoles (BTRs) and benzthiazoles (BTHs) are emerging contaminants with high production volume worldwide, which exhibit potential health risk to human. To date, little is known about the exposure of BTRs and BTHs (BTs) on human, especially

In the present study, the authors aimed to characterise the exposure profiles, temporal variability, and potential predictors of urinary BTs during pregnancy.

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in the context of pregnancy. In the present study, the authors aimed to characterise the exposure profiles, temporal variability, and potential predictors of urinary BTs during pregnancy. Between 2014 and 2015, we recruited 856 pregnant women in Wuhan who provided urine samples at three trimesters (13.1 ± 1.1 , 23.7 ± 3.2 , and 35.7 ± 3.4 gestational weeks). The authors measured the urinary concentrations of five BTRs (1-H-benzotriazole, 1-hydroxy-benzotriazole, xylyltriazole, tolyltriazole, 5-chloro-1-H-benzotriazole) and five BTHs (benzothiazole, 2-hydroxy-benzothiazole, 2-methylthio-benzothiazole, 2-amino-benzothiazole, 2-thiocyanomethylthio-benzothiazole) to characterize the exposure profiles of BTs. The intra-class correlation coefficients (ICCs) were calculated to assess the temporal variability and investigated potential predictors of urinary BTs by using the mixed models. Most of the targeted BTs were detected in over 50% of urine samples, except for 5-chloro-1-H-benzotriazole (9.3%) and 2-thiocyanomethylthio-benzothiazole (1.4%). The predominant BTRs in urine was 1-hydroxy-benzotriazole [Geometric Mean (GM): 0.77 ng/mL]. Benzothiazole was the major derivative in urine samples with a GM concentration of 1.6 ng/mL. Correlations among BTHs ($r = 0.04-0.39$) were higher than that among BTRs ($r = 0.02-0.14$). The exposure pattern was constant at low level and co-exposure to all the targeted compounds was infrequent during pregnancy. Urinary concentrations of BTRs exhibited considerable within-subject variation (ICCs: 0.12-0.56) during pregnancy. Relatively high temporal reliability was observed for urinary concentrations of BTHs with ICCs ranging from 0.42 to 0.85. It was found that parity, household income, pregnancy occupational status, sampling season and menstrual cycle were associated with urinary concentrations of BTs in pregnant women ($P < 0.05$). To the best of our knowledge, this is the first study to report the exposure profiles, variability and predictors of urinary BTs among pregnant women. Exposure assessment using multiple samples is essential in reducing measurement errors and identifying susceptible window of exposure in etiological studies. The potential predictors of urinary BTs raised concerns on tracing exposure routes and eliminating confounding variables in future studies. In the present study, the authors aimed to characterise the exposure profiles, temporal variability, and potential predictors of urinary BTs during pregnancy.

Authors: Zhou Y, Liu H, Li J, Xu S, Li Y, Zhao H, Jin H, Liu W, Chung ACK, Hong Y, Sun X, Jiang Y, Zhang W, Fang J, Xia W, Cai Z.

Full Source: Environment International. 2018 Oct 29. pii: S0160-4120(18)31499-5. doi: 10.1016/j.envint.2018.10.050. [Epub ahead of print]

In this study, the concentrations of Mn, Cd, As, Pb, Cu, Zn, Cr and Ni in soil, air, water, rice, vegetable, fish, poultry meat and pork from a Pb-Zn mining area and a Mn mining area in Huayuan county, China were determined by inductively coupled plasma mass spectrometry.

Different exposure profile of heavy metal and health risk between residents near a Pb-Zn mine and a Mn mine in Huayuan county, South China

2019-01-30

Heavy metal contamination of environmental media in mining area is a global major concern because of its potential threat for human health through food chain. However, the comparison of exposure level and health risk is scarce among people living in the vicinity of mining area with different pollution source. In this study, the concentrations of Mn, Cd, As, Pb, Cu, Zn, Cr and Ni in soil, air, water, rice, vegetable, fish, poultry meat and pork from a Pb-Zn mining area and a Mn mining area in Huayuan county, China were determined by inductively coupled plasma mass spectrometry. Results showed that the environmental media and foodstuffs in the two areas were contaminated by Cd, Pb, Zn, Cu, Cr and Ni. However, the pollution was more serious in Pb-Zn mining area than Mn mining area. The total hazard index (HI) was 6.59 and 4.55 in Pb-Zn mining area and Mn mining area, respectively, indicating a moderate non-carcinogenic risk of local people. As intake via rice ingestion was the predominant contributor to the total HI in the two mining areas, accounting for 25% and 35%, respectively. For Pb-Zn mining area, Cd intake through vegetable consumption and Mn intake via air inhalation appeared to be another two important components contributing to HI. This study highlights the multi-element and multi-pathway exposure assessment to evaluate the potential health risk and emphasizes concerns to reduce As and Cd in agricultural products as well as Mn in air to decrease the detrimental health effects of local resident.

Authors: Du Y, Chen L, Ding P, Liu L, He Q, Chen B, Duan Y.

Full Source: Chemosphere. 2019 Feb; 216:352-364. doi: 10.1016/j.chemosphere.2018.10.142. Epub 2018 Oct 20.