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CONTACT US

subscribers@chemwatch.net

tel +61 3 9572 4700

fax +61 3 9572 4777

1227 Glen Huntly Rd

Glen Huntly

Victoria 3163 Australia

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ENVIRONMENTAL RESEARCH

Photochemical degradation of BPF, BPS and BPZ in aqueous solution: Identification of transformation products and degradation kinetics.

2019-04-15

Bisphenols (BPs) are industrial chemicals that are used as monomers in the production of polycarbonate plastics and epoxy resins. These compounds can leach into the aqueous environment, where they can potentially have toxic effects. The aim of this study was to assess the photochemical degradation of three common bisphenols: BPF, BPS and BPZ in aqueous solution and determine their degradation kinetics and characterise their transformation products. Three independent experiments were performed based on: 1) direct photolysis using UV irradiation, 2) cyclodextrin-enhanced photolysis and 3) the photo-Fenton reaction. Analysis was performed using gas chromatography-mass spectrometry (GC-MS) and liquid chromatography coupled to high-resolution quadrupole-time-of-flight mass spectrometry (LC-QTOF-MS). This approach enabled for the first time a comparison between various conditions of photochemical degradation, revealing to be an effective way of removing (>90%) BPF, BPS and BPZ from aqueous samples. In all cases, degradation followed a pseudo-first order kinetic profile, while removal efficiency and formation of transformation products depended on the applied process. The photo-Fenton process resulted in the shortest half-lives (16.1–21.7 min) and generated the highest number of transformation products. Overall, in this study, 11 novels and eight previously reported TPs were identified.

Authors: Kovačič A, Gys C, Kosjek T, Covaci A, Heath E.

Full Source: Science of the Total Environment. 2019 May 10; 664:595-604.

doi: 10.1016/j.scitotenv.2019.02.064. Epub 2019 Feb 5.

The aim of this study was to assess the photochemical degradation of three common bisphenols: BPF, BPS and BPZ in aqueous solution and determine their degradation kinetics and characterise their transformation products.

Sublethal Effects of the Insecticide Pyriproxyfen on the European Honey Bee (Hymenoptera: Apidae)

2019-04-15

Pyriproxyfen (PQZ) is an Insecticide Resistance Action Committee (IRAC) Group 9 insecticide that has recently been registered for use in the United States for control of soft-bodied sucking insect pests. Although it has been classified as practically nontoxic to honey bees, *Apis mellifera* L. (Hymenoptera: Apidae), based on acute contact bioassays, additional information on sublethal effects of this insecticide on honey bees is lacking. Using a combination of laboratory assays with video movement

tracking software and near-field evaluations of colonies foraging in a high-tunnel experiment, the authors determined that, when fed PQZ at a concentration of 84 mg active ingredient (ai)/litre (= ppm) in sugar water, a reduction in overall movement by the foraging worker bees was observed. However, when provided with honey reserves in the hive, honey bees rejected the PQZ-treated sugar water. These results indicate that, if ingested at levels of 84 mg ai/litre, PQZ could have a negative effect on honey bee behaviour; however, honey bee workers appear to be able to detect the presence of PQZ in their food and reject it.

Authors: Wilson JM, Anderson TD, Kuhar TP.

Full Source: Journal of Economic Entomology. 2019 Feb 16. pii: toz014. doi: 10.1093/jee/toz014. [Epub ahead of print]

Multi-phase distribution and risk assessment of endocrine disrupting chemicals in the surface water of the Shaying River, -Huai River Basin, China

2019-04-15

In the present study, the authors investigated the multi-phase distribution and oestrogenic effects of endocrine disrupting chemicals (EDCs) in suspended particulate matter (SPM), colloids, and soluble phases from the Shaying River to assess the composition of oestrogenic compounds and associated oestrogenic risk. The yeast two hybrid (YES) method, cross-flow ultrafiltration (CFUF), and LC-MS/MS were employed. Risk quotient (RQ) values ranged from 0.72 to 3.88, revealing that the Shaying River posed high oestrogenic risk to aquatic organisms. The contribution ratios of the target EDCs to the EEQYES ranged from 62.7% to 92.5%, indicating that these chemicals were major contributors of oestrogenic effects in the Shaying River. Further, 54.0-77.8% of the detected EDCs were distributed in the soluble phase, 15.1-31.7% were bound to colloidal substances, and 3.90-19.4% EDCs were associated with SPM. Significant correlation between total EDC abundance and COD contents was detected, and the concentrations of endogenous oestrogens (E1, E2, and E3) were positively correlated with total nitrogen (TN) and total phosphorus (TP). In addition, the in-situ SPM-soluble (K_{poc}) and colloid-soluble partition (K_{coc}) coefficients were calculated. The log K_{poc} values of target compounds varied from 4.10 to 5.19, while log K_{coc} values ranged from 4.25 to 5.56. Their K_{coc} values were larger than the K_{poc} values, indicating that

In the present study, the authors investigated the multi-phase distribution and oestrogenic effects of endocrine disrupting chemicals (EDCs) in suspended particulate matter (SPM), colloids, and soluble phases from the Shaying River to assess the composition of oestrogenic compounds and associated oestrogenic risk.

organic colloids were the most important carriers of EDCs in the aquatic environment.

Authors: Huang Y, Xie X, Zhou LJ, Ji X, Gao B, Xu GZ, Li A.

Full Source: *Ecotoxicology & Environmental Safety*. 2019 May 30; 173:45-53. doi: 10.1016/j.ecoenv.2019.02.016. Epub 2019 Feb 11.

Assessing effects of germline exposure to environmental toxicants by high-throughput screening in *C. elegans*

2019-04-15

Chemicals that are highly prevalent in our environment, such as phthalates and pesticides, have been linked to problems associated with reproductive health. However, rapid assessment of their impact on reproductive health and understanding how they cause such deleterious effects, remain challenging due to their fast-growing numbers and the limitations of various current toxicity assessment model systems. The authors screened 46 chemicals that are widely present in the environment, but for which effects in the germline remain poorly understood. These included pesticides, phthalates, and chemicals used in hydraulic fracturing and crude oil processing. Of the 46 chemicals tested, 41% exhibited levels of aneuploidy higher than those detected for bisphenol A (BPA), an endocrine disruptor shown to affect meiosis, at concentrations correlating well with mammalian reproductive endpoints. A further 3 candidates eliciting aneuploidy: dibutyl phthalate (DBP), a likely endocrine disruptor and frequently used plasticizer, and the pesticides 2-(thiocyanomethylthio) benzothiazole (TCMTB) and permethrin, were examined. Exposure to these chemicals resulted in increased embryonic lethality, elevated DNA double-strand break (DSB) formation, activation of p53/CEP-1-dependent germ cell apoptosis, chromosomal abnormalities in oocytes at diakinesis, impaired chromosome segregation during early embryogenesis, and germline-specific alterations in gene expression. This study indicates that this high-throughput screening system is highly reliable for the identification of environmental chemicals inducing aneuploidy, and provides new insights into the impact of exposure to three widely used chemicals on meiosis and germline function.

Authors: Shin N, Cuenca L, Karthikraj R, Kannan K, Colaiácovo MP.

Full Source: *PLoS Genet*. 2019 Feb 14; 15(2): e1007975. doi: 10.1371/journal.pgen.1007975. eCollection 2019 Feb.

In this study, the authors performed a high-throughput screen in *C. elegans* to identify chemicals inducing aneuploidy as a result of impaired germline function.

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Affordable Production of Antioxidant Aqueous Solutions by Hydrodynamic Cavitation Processing of Silver Fir (*Abies alba* Mill.) Needles

2019-04-15

Extracts from parts of coniferous trees have received increased interest due to their valuable bioactive compounds and properties, useful for plenty of experimental and consolidated applications, in fields comprising nutraceuticals, cosmetics, pharmacology, food preservation, and stimulation of plant growth. However, the variability of the bioactive properties, the complexity of the extraction methods, and the use of potentially harmful synthetic chemicals, still represent an obstacle to the spreading of such valuable natural compounds. Hydrodynamic cavitation is emerging as a promising innovative technique for the extraction of precious food components and by-products from waste raw material of the agro-food production chain, which can improve processing efficiency, reduce resource consumption, and produce healthy, high-quality products. In this study, a process based on controlled hydrodynamic cavitation was applied for the first time to the production of aqueous solutions of silver fir (*Abies alba* Mill.) needles with enhanced antioxidant activity. The observed levels of the *in vitro* antioxidant activity, comparable or higher than those found for reference substances, pure extracts, and other water extracts and beverages, highlight the very good potential of the hydrodynamic cavitation (HC) process for the creation of solvent-free, aqueous solutions endowed with bioactive compounds extracted from silver fir needles.

Authors: Albanese L, Bonetti A, D'Acqui LP, Meneguzzo F, Zabini F.

Full Source: *Foods*. 2019 Feb 12;8(2). pii: E65. doi: 10.3390/foods8020065.

In this study, a process based on controlled hydrodynamic cavitation was applied for the first time to the production of aqueous solutions of silver fir (*Abies alba* Mill.)

MEDICAL RESEARCH

Ovarian Metabolism of an Environmentally Relevant Phthalate Mixture

2019-04-15

Phthalates are synthetic chemicals with widespread human exposure due to their use as additives in consumer products. Phthalate diesters are hydrolysed in the environment and in the body to monoesters that may be more toxic than the parent compounds. This study tested the hypothesis that adult mouse antral follicles, but not neonatal ovaries, are able to metabolise an environmentally relevant mixture of phthalates. Whole neonatal ovaries and isolated adult antral follicles from CD-1 mice were cultured in media treated with vehicle control or 0.1-10 µg/mL of a mixture

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composed of 35% diethyl phthalate (DEP), 21% di(2-ethylhexyl) phthalate (DEHP), 15% dibutyl phthalate (DBP), 15% diisononyl phthalate (DiNP), 8% diisobutyl phthalate (DiBP), and 5% benzylbutyl phthalate (BzBP). After four days of culture, media were subjected to high performance liquid chromatography tandem mass spectrometry (HPLC-MS/MS) to measure the amounts of diester phthalates and monoester metabolites. Ovaries and follicles were collected to measure the gene and protein expression of the enzymes required for phthalate metabolism. Monoester metabolites for all phthalates except DiNP were detected in the media for both culture types at most doses. The long-chain phthalates (BzBP, DEHP, and DiNP) were metabolised less than the short-chain phthalates (DEP, DBP, and DiBP) compared to respect This study tested the hypothesis that adult mouse antral follicles, but not neonatal ovaries, are able to metabolise an environmentally relevant mixture of phthalates. Expression of metabolising enzymes was observed for all treatment groups in both culture types. These data indicate that mouse ovaries are capable of metabolising low doses of phthalates and suggest that metabolic capacity differs for follicles at different stages of development.

Authors: Warner GR, Li Z, Houde ML, Atkinson CE, Meling DD, Chiang C, Flaws JA.

Full Source: Toxicological Science. 2019 Feb 15. pii: kfz047. doi: 10.1093/toxsci/kfz047. [Epub ahead of print]

A new avenue for treating neuronal diseases: Ceftriaxone, an old antibiotic demonstrating behavioural neuronal effects

2019-04-15

Several neurodegenerative disorders, namely Parkinson's disease dementia, dementia with Lewy bodies, and Alzheimer's disease, share common pathophysiological features, such as (1) cognitive deficits, (2) glutamatergic hyperactivity-related excitotoxicity, and (3) deposition of α -synuclein (α -syn) and β -amyloid ($A\beta$). Ceftriaxone (CEF) is a well-tested and safe drug that has been used as an antibiotic for several decades. Recent studies have demonstrated the following effects of CEF: (1) increasing glutamate transporter-1 expression and glutamate reuptake and suppressing excitotoxicity, (2) binding well with α -syn and inhibition of α -syn polymerization, (3) modulating expression of genes related to $A\beta$ metabolism, and (4) enhancing neurogenesis and recovery of neuronal density. In addition, our data revealed that CEF ameliorates seizure and abnormal neuronal firing in the brain. These results suggest the potential

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of CEF in treating neuronal disorders. This paper addresses the effects and pharmacology of CEF.

Authors: Tai CH, Bellesi M, Chen AC, Lin CL, Li HH, Lin PJ, Liao WC, Hung CS, Schwarting RK, Ho YJ.

Full Source: Behavioural Brain Research. 2019 Feb 12; 364:149-156. doi: 10.1016/j.bbr.2019.02.020. [Epub ahead of print]

Gut microbiota in liver disease: Too much is harmful, nothing at all is not helpful either

2019-04-15

The intestinal microbiome plays a major role in the pathogenesis of liver disease, with a hallmark event being dysbiosis, or an imbalance of pathobionts and beneficial bacteria with the associated deleterious effects on its host. Reducing the number of intestinal bacteria with antibiotic treatment is generally advantageous in experimental liver diseases. Complete absence of intestinal microbiota as in germ-free rodents can be protective in autoimmune hepatitis, and hepatic tumours induced by chemicals; or it can exacerbate disease as in acute toxic liver injury and liver fibrosis/cirrhosis. In alcoholic liver disease, non-alcoholic fatty liver disease (NAFLD) and autoimmune cholangiopathies, germ-free status can be associated with worsened or improved hepatic phenotype depending on the experimental model and type of rodent. Some of the unexpected outcomes can be explained by limitations of a rodent raised in a germ-free environment including a deficient immune system, an altered metabolism of lipids, cholesterol, xenobiotics/toxins and bile acids. Given these limitations and to advance the understanding of the interactions between host and intestinal microbiota, simplified model systems such as humanised gnotobiotic mice, or gnotobiotic mice mono-associated with a single bacterial strain or colonised with a defined set of microbes, are unique and useful models for investigation of liver disease in a complex ecosystem.

Authors: Hartmann P, Chu H, Duan Y, Schnabl B.

Full Source: American Journal of Physiology-Gastrointestinal and Liver Physiology. 2019 Feb 15. doi: 10.1152/ajpgi.00370.2018. [Epub ahead of print]

The intestinal microbiome plays a major role in the pathogenesis of liver disease, with a hallmark event being dysbiosis, or an imbalance of pathobionts and beneficial bacteria with the associated deleterious effects on its host.

Mechanism of action of 4-substituted phenols to induce vitiligo and anti-melanoma immunity

2019-04-15

Monobenzene is a 4-substituted phenol that can induce vitiligo and antimelanoma immunity. In the present study, the authors investigated the influence of the chemical structure on the biological activity of a series of structurally-related 4-substituted phenols. All phenols inhibited cellular melanin synthesis, and eight of ten phenols inhibited tyrosinase activity, using the MBTH assay. These phenols also induced glutathione (GSH) depletion, indicative of quinone formation and protein thiol binding, which can increase the immunogenicity of melanosomal proteins. Specific T cell activation was found upon stimulation with phenol-exposed pigmented cells, which also reacted with unexposed cells. In contrast, 4-tertbutylphenol induced immune activation was not restricted to pigment cells, analogous to contact sensitisation. The authors concluded that 4-substituted phenols can induce specific T cell responses against melanocytes and melanoma cells, also acting at distant, unexposed body sites, and may confer a risk of chemical vitiligo. Conversely, these phenols may be applicable to induce specific antimelanoma immunity.

Authors: Kammeyer A, Willemsen KJ, Ouwerkerk W, Bakker WJ, Ratsma D, Pronk SD, Smit NP, Luiten RM.

Full Source: Pigment Cell Melanoma Research. 2019 Feb 14. doi: 10.1111/pcmr.12774. [Epub ahead of print]

Monobenzene is a 4-substituted phenol that can induce vitiligo and antimelanoma immunity.

Determination of genomic N3-methylthymidine in human cancer cells treated with nitrosamines using capillary electrophoresis with laser-induced fluorescence

2019-04-15

Methylating substances alter DNA by forming N3-methylthymidine (N3mT), a mutagenic base modification. To develop a sensitive analytical method for the detection of N3mT in DNA based on capillary electrophoresis with laser-induced fluorescence detection (CE-LIF), the authors synthesised the N3mT-3'-phosphate as a chemical standard. The limit of detection was 1.9 amol of N3mT, which corresponds to one molecule of N3mT per 1000 normal nucleotides or 0.1%. With this method, the authors demonstrated that the carcinogenic nitrosamine N'-nitrosornicotine (NNN) induced N3mT in the human lung cancer cell line A549. Treatment with NNN also caused an elevated degree of 5-hydroxymethylcytidine (5hmdC) in DNA, while the methylation degree (i.e. 5-methylcytidine; 5mdC) stayed constant. According to the data,

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NNN could, via yet unknown mechanisms, play a role in the formation of N3mT as well as 5hmdC. In this study, the authors have developed a new sensitive analytical method using CE-LIF for the simultaneous detection of the three DNA modifications, 5mdC, 5hmdC and N3mT.

Authors: Kraiss AM, Kliem C, Arlt VM, Schmeiser HH.

Full Source: Electrophoresis. 2019 Feb 15. doi: 10.1002/elps.201800495.

[Epub ahead of print]

OCCUPATIONAL RESEARCH

Heart rate variability and peripheral nerve conduction velocity in relation to blood lead in newly hired lead workers

2019-04-15

Previous studies relating nervous activity to blood lead (BL) levels have limited relevance, because over time environmental and occupational exposure substantially dropped. The authors investigated the association of heart rate variability (HRV) and median nerve conduction velocity (NCV) with BL using the baseline measurements collected in the Study for Promotion of Health in Recycling Lead (NCT02243904). In 328 newly hired men (mean age 28.3 years; participation rate 82.7%), the authors derived HRV measures (power expressed in normalised units (nu) in the high-frequency (HF) and low-frequency (LF) domains, and LF/HF) prior to long-term occupational lead exposure. Five-minute ECG recordings, obtained in the supine and standing positions, were analysed by Fourier transform or autoregressive modelling, using Cardiax software. Motor NCV was measured at the median nerve by a handheld device (Brevio Nerve Conduction Monitoring System, NeuMed, West Trenton, NJ, USA). BL was determined by inductively coupled plasma mass spectrometry. Mean BL was 4.54 µg/dL (IQR 2.60-8.90 µg/dL). Mean supine and standing values of LF, HF and LF/HF were 50.5 and 21.1 nu and 2.63, and 59.7 and 10.9 nu and 6.31, respectively. Orthostatic stress decreased HF and increased LF ($p < 0.001$). NCV averaged 3.74 m/s. Analyses across thirds of the BL distribution and multivariable-adjusted regression analyses failed to demonstrate any association of HRV or NCV with BL. At the exposure levels

The authors investigated the association of heart rate variability (HRV) and median nerve conduction velocity (NCV) with BL using the baseline measurements collected in the Study for Promotion of Health in Recycling Lead

observed in this study, autonomous nervous activity and NCV were not associated with BL.

Authors: Yu CG, Wei FF, Yang WY, Zhang ZY, Mujaj B, Thijs L, Feng YM, Staessen JA.

Full Source: Occupational & Environmental Medicine. 2019 Mar 30. pii: oemed-2018-105379. doi: 10.1136/oemed-2018-105379. [Epub ahead of print]

Toenail concentrations of trace elements and occupational history in pancreatic cancer

2019-04-15

Some occupations potentially entailing exposure to cadmium, arsenic, lead, selenium, nickel, and chromium have been associated with an increased risk of exocrine pancreatic cancer (EPC), but no studies have assessed whether body concentrations of such compounds differed among subjects occupationally exposed and unexposed. No studies which found that exposure to such metals increased the risk of EPC assessed whether past occupations were the source of exposure. The aim of this study was to analyse the relationship between toenail concentrations of trace elements and occupational history in EPC patients. The study included 114 EPC cases personally interviewed on occupational history and lifestyle factors. Occupations were coded according to the International Standard Classification of Occupations 1988. Selected occupational exposures were assessed by two industrial hygienists and with the Finnish job-exposure matrix (Finjem). Concentrations of 12 trace elements were determined in toenail samples by inductively coupled plasma mass spectrometry. Adjusted geometric means (aGMs) and 95% confidence intervals (95% CI) were calculated. Patients occupationally exposed to aromatic hydrocarbon solvents (AHs) had higher concentrations of cadmium, manganese, lead, iron and vanadium. The aGM of cadmium concentrations for cases exposed to any pesticide was 0.056 µg/g [95% CI: 0.029-0.108], and, for unexposed cases, 0.023 µg/g [0.017-0.031]. Patients occupationally exposed to pesticides had higher concentrations of cadmium and manganese. Higher concentrations of vanadium, lead and arsenic were related to exposure to formaldehyde. Vanadium and lead were also associated with exposure to chlorinated hydrocarbon solvents, and arsenic was related to exposure to polycyclic aromatic hydrocarbons (PAHs). The authors concluded that patients occupationally exposed to AHs, pesticides, chlorinated hydrocarbon solvents, formaldehyde, volatile sulphur compounds and PAHs had higher

The aim of this study was to analyse the relationship between toenail concentrations of trace elements and occupational history in EPC patients.

concentrations of several metals. These elements may account for some of the occupational risks previously reported for pancreatic cancer.

Authors: Camargo J, Pumarega JA, Alguacil J, Sanz-Gallén P, Gasull M, Delclos GL, Amaral AFS, Porta M.

Full Source: Environment International. 2019 Mar 28; 127:216-225. doi: 10.1016/j.envint.2019.03.037. [Epub ahead of print]

A systematic literature review of epidemiologic studies of developmental manganese exposure and neurodevelopmental outcomes

2019-04-15

Neurotoxic effects of high-level occupational exposure to manganese (Mn) are well established; however, whether lower-level environmental exposure to Mn in early life causes neurodevelopmental toxicity in children is unclear. A systematic literature review was conducted to identify and evaluate epidemiologic studies of specific Mn biomarkers assessed during gestation, childhood, or adolescence in association with neurodevelopmental outcomes, focusing on quantitative exposure-response estimates with specific endpoints that were assessed in multiple independent study populations. Study quality was evaluated using the revised RTI item bank and the Cochrane Risk of Bias tool, and the overall weight of epidemiologic evidence for causality was evaluated according to the Bradford Hill considerations. Twenty-two epidemiologic studies were identified that estimated associations between early-life Mn biomarkers and neurodevelopmental outcomes. Seven of these studies provided adjusted estimates for the association with child intelligence assessed using versions of the Wechsler Intelligence Scales for Children; no other specific neurodevelopmental endpoints were assessed in more than three independent study populations each. Among the studies of child intelligence, five studies in four independent populations measured blood Mn, three studies measured hair Mn, and one measured dentin Mn. Overall, cross-sectional associations between Mn biomarkers and measures of child intelligence were mostly statistically nonsignificant but in a negative direction; however, the lone prospective cohort study found mostly null results, with some positive (favourable) associations between dentin Mn and child intelligence. Studies were methodologically limited by their cross-sectional design and potential for confounding and selection bias, as well as unaddressed questions on exposure assessment validity and biological plausibility. The statistical associations reported in the few studies of specific Mn biomarkers and specific neurodevelopmental endpoints do not establish causal effects based on

the Bradford Hill considerations. Additional prospective cohort studies of Mn biomarkers and validated neurodevelopmental outcomes, and a better understanding of the aetiologic relevance of Mn biomarkers, are needed to shed light on whether environmental exposure to Mn causes adverse neurodevelopmental effects in children.

Authors: Leonhard MJ, Chang ET, Loccisano AE, Garry MR.

Full Source: Toxicology. 2019 Mar 27; 420:46-65. doi: 10.1016/j.

tox.2019.03.004. [Epub ahead of print]

Congenital anomalies in the offspring of occupationally exposed mothers: a systematic review and meta-analysis of studies using expert assessment for occupational exposures

2019-04-15

Is there an association between maternal occupational exposure to solvents, pesticides and metals as assessed by expert-based assessment and congenital anomalies in the offspring? There is an association between maternal occupational exposure to solvents and congenital anomalies in the offspring, including neural tube defects, congenital heart defects and orofacial clefts. One important environmental risk factor for development of congenital anomalies is maternal occupational exposure to chemicals in the workplace prior to and during pregnancy. A number of studies have assessed the association with often conflicting results, possibly due to different occupational exposure assessing methods. For this systematic review with meta-analysis, the search terms included maternal occupation, exposure, congenital anomalies and offspring. Electronic databases MEDLINE and EMBASE were searched for English studies up to October 2017. Two reviewers independently screened all citations identified by the search. Case-control studies and cohort studies were included if (I) they reported on the association between maternal occupational exposure to solvents, pesticides or metals and congenital anomalies, and (II) assessment of occupational exposure was performed by experts. Data on study characteristics, confounders and odds ratios (ORs) were extracted from the included studies for four subgroups of congenital anomalies. Methodological quality was assessed using the Newcastle-Ottawa Scale. In the meta-analysis, random effects models were used to pool estimates. In total, 2806 titles and abstracts and 176 full text papers were screened. Finally, 28 studies met the selection criteria, and 27 studies could be included in the meta-analysis. Our meta-analysis showed that maternal occupational exposure to solvents was associated with neural tube defects (OR: 1.51, 95%CI: 1.09-2.09) and congenital heart defects

Is there an association between maternal occupational exposure to solvents, pesticides and metals as assessed by expert-based assessment and congenital anomalies in the offspring? There is an association between maternal occupational exposure to solvents and congenital anomalies in the offspring, including neural tube defects, congenital heart defects and orofacial clefts.

(OR: 1.31, 95%CI:1.06-1.63) in the offspring. Also, maternal occupational exposure to glycol ethers, a subgroup of solvents, was associated with neural tube defects (OR: 1.93, 95%CI: 1.17-3.18) and orofacial clefts (OR: 1.95, 95%CI: 1.38-2.75) in the offspring. Only one study investigated the association between maternal occupational exposure to solvents and hypospadias and found an association (OR: 3.63, 95%CI: 1.94-7.17). Results of the included studies were consistent. In this meta-analysis, the authors found no associations between occupational exposure to pesticides or metals and congenital anomalies in the offspring. A limited number of studies was included, which made it impossible to calculate pooled estimates for all congenital anomalies, analyse individual chemicals or calculate exposure-response relations. Bias could have been introduced because not all included studies corrected for potentially confounding factors. Employers and female employees should be aware of the possible teratogenic effects of solvent exposure at the workplace. Therefore, it is important that clinicians and occupational health specialist provide women with preconception advice on occupational solvent exposure, to reduce the congenital anomaly risk. NSp was paid by the Graduate School of Medical Sciences (MD/PhD program), UMCG, Groningen, the Netherlands. EUROCAT Northern Netherlands is funded by the Dutch Ministry of Health, Welfare and Sports. There are no competing interests. Authors: Spinder N, Prins JR, Bergman JEH, Smidt N, Kromhout H, Boezen HM, de Walle HEK.

Full Source: Human Reproduction. 2019 Mar 30. pii: dez033. doi: 10.1093/humrep/dez033. [Epub ahead of print]

Sex and Gender Role Differences in Occupational Exposures and Work Outcomes Among Registered Nurses in Correctional Settings

2019-04-15

The correctional environment exposes registered nurses to unique occupational health hazards including, but not limited to, an increased risk for workplace violence. Gender role expectations regarding femininity and masculinity may influence occupational exposures and outcomes differently. Risk comparisons between male and female registered nurses working in correctional settings, have been minimally examined. With the proportion of male registered nurses working in corrections higher than that of nurses working in other healthcare sectors, and with the increasing number of males entering the nursing workforce in general, it is important to characterise and understand occupational exposures and outcomes of male and female registered nurses, especially those working

This study aims to describe and compare sex and gender role differences in occupational exposures and work outcomes among correctional registered nurses.

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in correctional settings. This study aims to describe and compare sex and gender role differences in occupational exposures and work outcomes among correctional registered nurses. A cross-sectional web-based survey using Qualtrics was administered to registered nurses working in a northeastern correctional healthcare system between June and October 2016. The survey was composed of 71 items from the CPH-NEW Healthy Workplace All Employee Survey, Assessing Risk of Exposure to Blood and Airborne Pathogens and General Health Survey, Bem Sex Role Inventory-Short Form (BSRI-SF), and the Negative Acts Questionnaire-Revised. Of 95 registered nurse participants, 75% were female with the highest percentage identified as belonging to the feminine group (37%), while the highest percentage of male participants were identified as belonging to the androgynous group (33%). Females worked primarily on the first shift, while males tended to work the second and third shifts ($P < 0.05$). Over one third of all participants (37%) reported having experienced a sharp-related injury and having been exposed to blood-borne pathogens and body fluids within the previous 2-5 years. The majority of the participants (>95%) reported being at risk for workplace violence and having been victims of workplace violence perpetrated by an inmate. Significant gender differences ($P < 0.0001$) were noted in the bullying exposure with androgynous nurses having higher occasional bullying. There was a marginal difference in burnout for females ($M = 6.8, SD = 2.1$) and males ($M = 5.8, SD = 1.9, P = 0.05$). Effective interventions are needed to address the sex and gender role-based differences in bullying exposure and burnout in order to promote the overall health and well-being of correctional registered nurses.

Authors: Ghaziri ME, Dugan AG, Zhang Y, Gore R, Castro ME.

Full Source: *Annals in Work Exposure & Health*. 2019 Mar 30. pii: wxz018.

doi: 10.1093/annweh/wxz018. [Epub ahead of print]

PUBLIC HEALTH RESEARCH

Patterns and dietary determinants of essential and toxic elements in blood measured in mid-pregnancy: The Norwegian Environmental Biobank

2019-04-15

Inadequate stores or intakes of essential minerals in pregnancy, or too high exposure to both toxic and essential elements, can have adverse effects on mother and child. The main aims of this study were to describe the concentrations and patterns of essential and toxic elements measured

The main aims of this study were to describe the concentrations and patterns of essential and toxic elements measured in maternal whole blood during pregnancy; identify dietary, lifestyle and sociodemographic determinants of element status; and explore the impact of iron deficiency on blood element concentrations.

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in maternal whole blood during pregnancy; identify dietary, lifestyle and sociodemographic determinants of element status; and explore the impact of iron deficiency on blood element concentrations. This study is based on blood samples collected from 2982 women in gestational week 18 in The Norwegian Mother and Child Cohort study (MoBa) which were analysed as part of the Norwegian Environmental Biobank. We derived blood element patterns by exploratory factor analysis, and associations between blood element patterns and diet were explored using sparse partial least squares (sPLS) regression. Blood concentrations were determined for the essential elements (in the order of most abundant) Zn > Cu > Se > Mn > Mo > Co, and the toxic metals Pb > As > Hg > Cd > Tl. The concentrations were in ranges that were similar to or sometimes more favourable than in other pregnant and non-pregnant European women. The authors identified two blood element patterns; one including Zn, Se and Mn and another including Hg and As. For the Zn-Se-Mn pattern, use of multimineral supplements was the most important dietary determinant, while a high score in the Hg-As pattern was mainly determined by seafood consumption. Concentrations of Mn, Cd and Co were significantly higher in women with iron deficiency (plasma ferritin < 12 µg/L) than in women with plasma ferritin ≥ 12 µg/L. The findings from this study illustrates complex relationships and coexistence of essential and toxic elements. Their potential interplay adds to the challenges of studies investigating health effects related to either diet or toxicants.

Authors: Caspersen IH, Thomsen C, Haug LS, Knutsen HK, Brantsæter AL, Papadopoulou E, Erlund I, Lundh T, Alexander J, Meltzer HM.

Full Source: Science of the Total Environment. 2019 Mar 20; 671:299-308. doi: 10.1016/j.scitotenv.2019.03.291. [Epub ahead of print]

The authors evaluated the use of eleven organophosphate and two carbamate insecticides in association with NHL in the North American Pooled Project

Non-Hodgkin lymphoma risk and organophosphate and carbamate insecticide use in the north American pooled project

2019-04-15

Organophosphates and carbamates have been among the most commonly used insecticides, with both agricultural and residential uses. Previous studies have suggested associations of non-Hodgkin lymphoma (NHL) with some of these chemicals; however, many studies have been limited in their ability to evaluate associations with lymphoma subtypes. The authors evaluated the use of eleven organophosphate and two carbamate insecticides in association with NHL in the North American Pooled Project, which includes data from case-control studies in the United States and Canada (1690 cases/5131 controls). Unconditional

logistic regression adjusting for potential confounders, including use of other pesticides, was used to estimate odds ratios (OR) and 95% confidence intervals (CI) for associations between these chemicals and NHL overall, and NHL subtypes, i.e., follicular (FL), diffuse large B-cell (DLBCL), small lymphocytic lymphoma (SLL) and others. Ever use of malathion was associated with increased risk of NHL overall (OR = 1.43; 95% CI: 1.14-1.81) compared with never users. Categories using tertiles of duration (<4 yrs., 4-12 yrs., and >12 yrs) also showed a significant exposure-response for increasing years of use of malathion and risk of NHL (OR<4vsUnex = 1.33 (0.88, 2.03), OR4-12vsUnex = 1.42 (1.02, 1.96), OR>12vsUnex = 1.55 (1.05, 2.28, p-trend < 0.01)). In addition, malathion use was statistically significantly associated with FL (OR = 1.58; 95% CI: 1.11-2.27) and DLBCL (OR = 1.61; 95% CI: 1.16-2.22) while there were no apparent associations with SLL or other subtypes, the p-value for heterogeneity across subtypes, however, was not significant. These results support previous studies suggesting an association between insecticide use and NHL overall, and provide new information on associations with NHL subtypes.

Authors: Koutros S, Harris SA, Spinelli JJ, Blair A, McLaughlin JR, Zahm SH, Kim S, Albert PS, Kachuri L, Pahwa M, Cantor KP, Weisenburger DD, Pahwa P, Pardo LA, Dosman JA, Demers PA, Beane Freeman LE.

Full Source: Environment International. 2019 Mar 27; 127:199-205. doi: 10.1016/j.envint.2019.03.018. [Epub ahead of print]

Distance decay gradients in hazardous air pollution concentrations around oil and natural gas facilities in the city of Los Angeles: A pilot study.

2019-04-15

In this study, the authors investigate air pollutant distance decay gradients around an upstream oil and natural gas (ONG) facility located within a densely populated urban community in South Los Angeles. Despite the difficulties associated with interpreting air quality measurements in complex, multi-source urban environments, this pilot investigation was able to identify distance decay around the target ONG site and distinguish added air quality burden of several volatile organic compounds associated with ONG operations. Moving forward, it is recommended additional research to better distinguish air quality contributions from ONG in urban environments.

Authors: Garcia-Gonzales DA, Shamasunder B, Jerrett M.

Full Source: Environmental Research. 2019 Mar 14; 173:232-236. doi: 10.1016/j.envres.2019.03.027. [Epub ahead of print]

In this study, the authors investigate air pollutant distance decay gradients around an upstream oil and natural gas (ONG) facility located within a densely populated urban community in South Los Angeles.

Intervention to reduce gymnast exposure to flame retardants from pit foam: A case study.

2019-04-15

Gymnasts can have high exposures to flame retardants (FRs), which are used in gymnastics safety equipment such as the loose foam pit. Therefore, the authors aimed to reduce gymnast exposure to FRs by replacing the foam in the pit using foam free of additive FR and measuring personal exposure during practice using hand-wipes. To assure maintenance of fire safety we first conducted a flammability study and facilitated a fire inspection for our partner gym. The FR-treated cubes had similar heat release rates to the non-FR treated cubes, required a 11 cm larger flame size applied for 6 s longer to ignite, and took 4 min longer to reach peak flame height. Based on these findings and the presence of other fire safety measures including smoke detectors and a sprinkler system, the local fire and building departments approved replacement of the foam pit with FR-free foam. The authors then replaced foam in the gym's pit, verified it was free of any additive FRs, and quantified common halogenated and organophosphate FRs on hand-wipes collected from ten collegiate gymnasts before and after practice, pre- and post-intervention. A 5-fold decline was observed in the median mass of FRs found in pit foam that accumulated on hand-wipes during practice among gymnasts who used the foam pit ($p = 0.02$), indicating that replacing the foam in a pit using materials free of FRs can reduce gymnast exposure to these chemicals during practice.

Authors: Dembsey NA, Brokaw FM, Stapleton HM, Dodson RE, Onasch J, Jazan E, Carignan CC.

Full Source: Environment International. 2019 Mar 5. pii: S0160-4120(18)31849-X. doi: 10.1016/j.envint.2019.01.084. [Epub ahead of print]

The authors aimed to reduce gymnast exposure to FRs by replacing the foam in the pit using foam free of additive FR and measuring personal exposure during practice using hand-wipes.

Fluoride exposure and pubertal development in children living in Mexico City

2019-04-15

Previous animal and ecological studies have provided evidence for an earlier sexual maturation in females in relation to fluoride exposure; however, no epidemiological studies have examined the association between fluoride exposure and pubertal development in both boys and girls using individual-level biomarkers of fluoride. Capitalizing on an ongoing Mexican birth cohort study, the authors examined the association between concurrent urinary fluoride levels and physical markers of pubertal development in children. A cross-sectional study was conducted

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of 157 boys and 176 girls at age 10-17 years living in Mexico City. Ion-selective electrode-based diffusion methods were used to assess fluoride levels in urine, adjusting for urinary specific gravity. Pubertal stages were evaluated by a trained physician. Associations of fluoride with pubertal stages and age at menarche were studied using ordinal regression and Cox proportional-hazard regression, respectively. In the entire sample, the geometric mean and interquartile range (IQR) of urinary fluoride (specific gravity adjusted) were 0.59 mg/L and 0.31 mg/L, respectively. In boys, our analysis showed that a one-IQR increase in urinary fluoride was associated with later pubic hair growth (OR=0.71, 95% CI: 0.51-0.98, p=0.03) and genital development (OR=0.71, 95% CI: 0.53-0.95, p=0.02). No significant associations were found in girls, although the direction was negative. Childhood fluoride exposure, at the levels observed in this study, was associated with later pubertal development among Mexican boys at age 10-17 years. Further research is needed to confirm these findings.

Authors: Liu Y, Téllez-Rojo M, Hu H, Sánchez BN, Martínez-Mier EA, Basu N, Mercado-García A, Solano-González M, Peterson KE.

Full Source: Environmental Health. 2019 Mar 29;18(1):26. doi: 10.1186/s12940-019-0465-7.