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Therefore, the present work aimed to analyze if social insects, specifically ants, bees, and termites, provide a suitable habitat for the fungi concerned. Nine isolates were recovered and phylogenetic analysis identified two strains as potential agents of chromoblastomycosis, i.e., Fonsecaea pedrosoi CMRP 3076, obtained from a termite nest (n = 1) and Rhinocladiella similis CMRP 3079 from an ant exoskeleton (n = 1). In addition, we also identified Fonsecaea brasiliensis CMRP 3445 from termites (n = 1), Exophiala xenobiotica CMRP 3077 from ant exoskeleton (n = 1), Cyphellophoraaceae CMRP 3103 from bees (n = 1), Cladosporium sp. CMRP 3119 from bees (n = 1), Hawksworthiomyces sp. CMRP 3102 from termites (n = 1), and Cryptendoxyla sp. from termites (n = 2). The environmental isolate of F. pedrosoi CMRP 3076 was tested in two animal models, Tenebrio molitor and Wistar rat, for its pathogenic potential with fungal retention in T. molitor tissue. In the Wistar rat, the cells resembling muriform cells were observed 30 d after inoculation.

Authors: Lima BJFS, Voidaleski MF, Gomes RR, Fornari G, Soares JMB, Bombassaro A, Schneider GX, Soley BDS, de Azevedo CMPES, Menezes C, Moreno LF, Attili-Angelis D, Klisiowicz DDR, de Hoog S, Vicente VA


An indoor study of the combined effect of industrial pollution and turbulence events on the gut environment in a marine invertebrate.

2020-03-09
Natural storms are able to determine reworking of seabed up to considerable depths and favour suspension of sediment-associated
However, caffeine pollution was also found to affect areas isolated from human influence, such as Antarctica.

Characterization and comparison of groundwater quality and redox conditions in the Arakawa Lowland and Musashino Upland, southern Kanto Plain of the Tokyo Metropolitan area, Japan

2020-03-06

Groundwater is essential for the Earth biosphere but is often contaminated by harmful chemical compounds due to both anthropogenic and natural causes. A key factor controlling the fate of harmful chemicals in groundwater is the reduction/oxidation (redox) conditions. The formation factors for the groundwater redox conditions are insufficiently understood. In this study, long-term groundwater quality beneath one of the world megacities was monitored and evaluated. We measured and compared hydrogeochemical conditions including groundwater quality (35 chemical parameters) and redox conditions of five aquifers in the Arakawa Lowland and Musashino Upland, southern Kanto Plain of the Tokyo Metropolitan area, Japan. Monitoring results suggested the following: The main origin of groundwater is precipitation in both the Lowland and Upland areas. The three aquifers in the Arakawa Lowland are likely fully separated, with one unconfined and two confined aquifers under iron reducing and methanogenic conditions, respectively. Oppositely, in the Musashino

Ocurringene of caffeine in the freshwater environment: Implications for ecopharmacovigilance

2020-03-17

Owing to the substantial consumption of caffeinated food, beverages, and medicines worldwide, caffeine is considered the most representative pharmaceutically active compound (PhAC) pollutant based on its high abundance in the environment and its suitability as an indicator of the anthropogenic inputs of PhACs in water bodies. This review presents a worldwide analysis of 132 reports of caffeine residues in freshwater environments. The results indicated that more than 70% of the studies reported were from Asia and Europe, which have densely populated and industrially developed areas. However, caffeine pollution was also found to affect areas isolated from human influence, such as Antarctica. In addition, the maximum concentrations of caffeine in raw wastewater, treated wastewater, river, drinking water, groundwater, lake, catchment, reservoir, and rainwater samples were reported to be 3.60 mg/L, 55.5, 19.3, 3.39, 0.683, 174, 44.6, 4.87, and 5.40 μg/L, respectively. The seasonal variation in caffeine residues in the freshwater environment has been demonstrated. In addition, despite the fact that there was a small proportion of wastewater treatment plants in which the elimination rates of caffeine were below 60%, wastewater treatment is generally believed to have a high caffeine removal efficiency. From a pharmacy perspective, we proposed to adopt effective measures to minimize the environmental risks posed by PhACs, represented by caffeine, through a new concept known as ecopharmacovigilance (EPV). Some measures of EPV aimed at caffeine pollution have been advised, as follows: improving knowledge and perceptions about caffeine pollution among the public; listing caffeine as a high-priority PhAC pollutant, which should be targeted in EPV practices; promoting green design and production, rational consumption, and environmentally preferred disposal of caffeinated medicines, foods, and beverages; implementing intensive EPV measures in high-risk areas and during high-risk seasons; and integrating EPV into wastewater treatment programs.


Upland, the water masses in the two aquifers are likely partly connected, under aerobic conditions, and undergoing the same groundwater recharge and flow processes under similar hydrogeological conditions. The different groundwater redox conditions observed are likely caused by the very different groundwater residence times for the Arakawa Lowland and Musashino Upland.

Authors: Saito T, Spadini L, Saito H, Martins JMF, Oxarango L, Takemura T, Hamamoto S, Moldrup P, Kawamoto K, Komatsu T

Signaling pathways of oxidative stress in aquatic organisms exposed to xenobiotics

2020-03-26
Oxidative stress is frequently generated in cells of organisms exposed to environmental pollutants. The production of reactive oxygen species can have either adaptive or maladaptive consequences for the organism as well as for the entire population. However, regarding fish species and other invertebrates exposed to aquatic xenobiotics, the signaling pathways of oxidative stress still lacks a comprehensive characterization. After reviewing the recent literature, we show that important pathways described in mammals are also activated in aquatic species in response to a variety of xenobiotics. A central actor is the Nrf2/Keap1 pathway, which regulates the expression of ARE-driven genes including Gr, Gpx, or Cat. Other important activated pathways concern PPAR, MAPKs, NF-κB, and even AhR. Moreover, the autophagy and apoptosis pathways are also involved in the cellular response to oxidative stress. Importantly, there exists crosstalks between these pathways, which together activate a complex cellular antioxidative machinery in response to different xenobiotics. However, our knowledge of these responses in aquatic organisms is still fragmentary. Efforts should be made to extend the number of studied species and better characterize the organ-dependency and age-dependency of the responses. However, the huge number and variety of chemicals present in the environment makes the task difficult. Deciphering these key pathways can help to understand the mode of action of pollutants and consequently help to assess the environmental risk in aquatic ecosystems.

Authors: Silvestre F

CHEMICAL EFFECTS

Arsenic induces transgenerationla behavior disorders in Caenorhabditis elegans and its underlying mechanisms
2020-03-16
The present study aimed to identify the effects of arsenic on behaviors in Caenorhabditis elegans (C. elegans) and the transgenerational effects. The synchronized C. elegans (P generation) were exposed to 0, 0.2, 1.0, and 5.0 mM NaAsO2, and the subsequent generations (F1 and F2) were maintained on fresh nematode growth medium (NGM). The behaviors and growth were recorded at 0, 12, 24, 36, 48, 60, and 72 h post synchronization. The results demonstrated that arsenic affected various indicators regarding the behavior (head thrash, body bend, movement speed, wavelength, amplitude and so on) and in general the effects started to accumulate from 24 h and lasted throughout the exposure. The behavior impairments were transgenerational with varying patterns, amongst the head thrash and body bend responded most sensitively though the responses gradually declined across generations. Arsenic exposure inhibited the growth (body length, body width, and body area) in P. C. elegans from 24 h to 60 h, however there was no difference between treatments groups and the control at 72 h. Arsenic led to a dose-dependent degeneration of dopaminergic neurons in C. elegans, and inhibition of BAS-1 and CAT-2 expressions. The expressions of GCS-1, GSS-1, and SKN-1 were induced by arsenic exposure. Overall, chronic arsenic exposure impaired the behaviors and there were transgenerational effects. The head thrash and body bend responded most sensitively. Arsenic induced behavioral disorders might be attributed to degeneration of dopaminergic neurons which was associated with oxidative stress.


Effects of Brominated and Organophosphate Ester Flame Retardants on Male Reproduction
2020-03-25
BACKGROUND:
Environmental chemicals that interfere with the production and/or action of hormones may have adverse effects on male reproduction. This review focuses on the possible impact of exposure to flame retardant chemicals...
During driving. We recruited a panel of 84 healthy participants to drive a vehicle equipped with a CO₂ filtration system for 1 h on a coastal road in a Northern Taiwan rural area. The operation modes of the CO₂ filtration system, including fresh air from open windows without a CO₂ filtration system (Control-mode), fresh air from an air conditioning (AC) system with closed windows and a false CO₂ filtration system in operation (Off-mode) or a true CO₂ filtration system in operation (On-mode), were examined. The repeated measurements of heart rate (HR), blood pressure (BP), CO₂, total volatile organic compounds (TVOCs), particulate matter ≤2.5 μm in aerodynamic diameter (PM₂.₅) and a simple question about drowsiness were obtained for each participant in three different modes. We found that decreased HR, systolic BP (SBP) and diastolic BP (DBP) and increased drowsiness were associated with increased levels of in-vehicle CO₂. The effects of in-vehicle CO₂ on adverse effects were highest in the Off-mode during driving. In the On-mode, the participants showed slight decreases in HR, SBP and DBP and slight increases in drowsiness. We concluded that the utilization of a CO₂ filtration system can reduce in-vehicle CO₂ levels and modify the effect of in-vehicle CO₂ on HR, BP and drowsiness among human subjects during driving.

**CONCLUSIONS:**
More research on human exposure to replacement flame retardants and the possibility that they may be associated with adverse reproductive health outcomes is a high priority.

**METHODS:**
PubMed database was searched for studies reporting the effects of brominated and organophosphate ester flame retardant chemicals on male reproduction.

**RESULTS:**
Cell-based, animal model, and human studies provide evidence that the PBDEs act as endocrine disrupting chemicals; further, exposure during critical windows of development may be associated with a permanent impact on male reproduction. In vitro and animal model data are accumulating with respect to the effects of TBBPA and OPEs but few studies have evaluated their impact on human health.

**OBJECTIVE:**
To review the literature on the effects of brominated and organophosphate ester flame retardant chemicals on male reproduction.

**RESULTS:**
In-vehicle carbon dioxide and adverse effects: An air filtration-based intervention study

2020-03-19
Drowsiness is considered a potential risk for traffic accidents. Exposure to high carbon dioxide (CO₂) levels in vehicles may result in unpleasant feeling, fatigue, drowsiness or lethargy among drivers and passengers. However, little is known about whether reducing CO₂ levels in vehicles by air filtration can relieve adverse effects among human subjects during driving. We recruited a panel of 84 healthy participants to drive a vehicle equipped with a CO₂ filtration system for 1 h on a coastal road in a Northern Taiwan rural area. The operation modes of the CO₂ filtration system, including fresh air from open windows without a CO₂ filtration system (Control-mode), fresh air from an air conditioning (AC) system with closed windows and a false CO₂ filtration system in operation (Off-mode) or a true CO₂ filtration system in operation (On-mode), were examined. The repeated measurements of heart rate (HR), blood pressure (BP), CO₂, total volatile organic compounds (TVOCs), particulate matter ≤2.5 μm in aerodynamic diameter (PM₂.₅) and a simple question about drowsiness were obtained for each participant in three different modes. We found that decreased HR, systolic BP (SBP) and diastolic BP (DBP) and increased drowsiness were associated with increased levels of in-vehicle CO₂. The effects of in-vehicle CO₂ on adverse effects were highest in the Off-mode during driving. In the On-mode, the participants showed slight decreases in HR, SBP and DBP and slight increases in drowsiness. We concluded that the utilization of a CO₂ filtration system can reduce in-vehicle CO₂ levels and modify the effect of in-vehicle CO₂ on HR, BP and drowsiness among human subjects during driving.

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**PHARMACEUTICAL/TOXICOLOGY**

**Serum Metabolites in Hand-Arm Vibration Exposed Workers**  
2020-03-20  
**OBJECTIVE:** To investigate whether low molecular organic biomarkers could be identified in blood samples from vibration exposed workers using a metabolomics.  
**METHODS:** The study population consisted of 38 metalworkers. All participants underwent a standardized medical examination. Blood samples were collected before and after work shift and analyzed with GC-TOFMS. Multivariate modeling (orthogonal partial least-squares analysis with discriminant analysis [OPLS-DA]) were used to verify differences in metabolic profiles.  
**RESULTS:** Twenty-two study participants reported vascular symptoms judged as vibration-related. The metabolic profile from participants with vibration-induced white fingers (VWF) was distinctly separated from participants without VWF, both before and after vibration exposure.  
**CONCLUSION:** Metabolites that differed between the groups were identified both before and after exposure. Some of these metabolites might be indicators of health effects from exposure to vibrations.  
Authors: Vihlborg P, Graff P, Hagenbjörk A, Hadrévi J, Bryngelsson IL, Eriksson K  
Effect of fructose and its epimers on postprandial carbohydrate metabolism: A systematic review and meta-analysis

2020-03-10

AIMS: To synthesize the evidence of the effect of small doses (≤30-g/meal) of fructose and its epimers (allulose, tagatose, and sorbose) on the postprandial glucose and insulin response to carbohydrate-containing meals.

METHODS: MEDLINE, EMBASE, and the Cochrane Central Register of Controlled Trials were searched through to April 9, 2019. We included randomized (RCTs) and non-randomized acute, single-meal, controlled feeding trials that added ≤30-g of fructose or its epimers either prior to or with a carbohydrate-containing meal compared with the same meal alone. Outcomes included the incremental area under the curve (iAUC) for glucose and insulin, the Matsuda Insulin Sensitivity Index, and the Early Insulin Secretion Index. Data were expressed as ratio of means (RoM) with 95% CIs and pooled using the inverse variance method. The overall certainty of the evidence was evaluated using GRADE.

RESULTS: Forty trial comparisons (n = 400) were included (none for sorbose). Allulose significantly reduced the postprandial iAUC glucose response by 10% (0.90 [0.84 to 0.96], P < 0.01). Tagatose significantly reduced the postprandial iAUC insulin response by 25% (0.75 [0.62 to 0.91], P < 0.01) and showed a non-significant 3% reduction in the postprandial iAUC glucose response (0.97 [0.94 to 1.00], P = 0.07). There was no effect of fructose on any outcome. The certainty of the evidence was graded as low to moderate for fructose, moderate for allulose, and low for tagatose.

CONCLUSIONS: Small doses of allulose and tagatose, but not fructose, lead to modest improvements on postprandial glucose and insulin regulation. There is a need for long-term RCTs to confirm the sustainability of these improvements.

Authors: Braunstein CR, Noronha JC, Khan TA, Mejia SB, Wolever TM, Josse RG, Kendall CW, Sievenpiper JL

Knowledge and attitude among Lebanese women towards hazardous chemicals used in nail cosmetics

2020-03-26

Middle Eastern women seek frequently for self-adornment. Harmful effects of chemicals used in nail care services have involved women worldwide. This study was performed to determine Lebanese women's knowledge and attitudes toward adverse effects of compounds used in nail cosmetics. A national cross-sectional study was carried out using an online questionnaire and targeting women in Lebanon. Data was collected on sociodemographic characteristics, nail cosmetics' application, preventive measures, perceived knowledge and self-reported side effects associated with nail cosmetics' use. A total cumulative knowledge score was calculated to categorize consumer knowledge. A total of 573 women completed the survey. Young women with a high school education or beyond were overrepresented. Most of the participants preferred applying classic manicure and removers on a weekly basis. Over 82% had poor/fair knowledge about health hazards associated with chemical compounds used in nail cosmetics with their levels of education acting as a key factor. Skin and neurological symptoms were the more frequently self-reported symptoms. Interestingly, the use of a nail hardener was linked to a higher prevalence of headache, nausea, allergy, skin irritation, itching and burn. The prevalence of the three later symptoms was higher among gel users. Moreover, few participants read nail cosmetics' labels or questioned their safety. Although nail cosmetics' application was common among Lebanese women, there is poor knowledge regarding their harmful effects. Based on these findings, it is warranted to launch health awareness campaigns and introduce a cosmetovigilance system to ensure the safety of the consumer products.

Authors: Lteif M, Samia El Hayek M, Azouri H, Antonios D

OCCUPATIONAL

Environmental chemicals (ECs) detected in reproductive tissues and fluids induce similar, short term, adverse effects on human and dog sperm.

2020-04-03

Decline in the dog, which shares the same environment. These data are indicative of a common cause. Environmental chemicals (ECs) detected in reproductive tissues and fluids induce similar, short term, adverse effects on human and dog sperm. Both pre and post natal stages of early life development are sensitive to chemical exposures and such changes could potentially cause long term effects in the adult. The environmental “pollutome” (mixtures of ECs), is determined by industrialisation, atmospheric deposition, and bio-accumulation, and characterises real-life exposure. In Arctic ecosystems, dietary and non-dietary chemical contaminants are detectable in biological tissues and linked with adverse health effects in both dogs and their handlers. In the female, such exposure could contribute to disorders such as ovarian insufficiency, dysregulated follicle development, ovarian cancer and polycystic ovarian syndrome. In the dog, ovarian chemical concentrations are greater than in the tests, and preliminary studies indicate that dietary exposures may influence the sex ratio in the offspring in favour of females. Within this article, we review current knowledge on chemical effects on human reproduction and suggest that the dog, as a sentinel species for such effects, is an essential tool for addressing critical data gaps in this field.

Authors: Sumner RN, Harris IT, Van Der Mescht M, Byers A, England GCW, Lea RG
To determine the early signs of subclinical nephrotoxic effects among some Egyptian workers exposed to silica in the pottery industry.

**BACKGROUND:**
For many years, several studies drew attention to the possible nephrotoxic effects of silica and distinct renal dysfunction involving glomerular and renal tubules in workers exposed to silica.

**OBJECTIVE:**
To determine the early signs of subclinical nephrotoxic effects among some Egyptian workers exposed to silica in the pottery industry.

**METHODS:**
This study was carried out in El-Fawakhir handicraft pottery area, in Greater Cairo, Egypt. The studied population included 29 non-smoking male workers occupationally exposed to silica in addition to 35 non-smoking administrative male subjects who represented the comparison group in the study. Measured urinary parameters were concentrations of total protein (TP), microalbumin (Malb), activities of alkaline phosphatase (ALP), γ-glutamyl transferase (γ-GT), lactate dehydrogenase (LDH), kidney injury molecule-1 (KIM-1), and silicon (Si).

**RESULTS:**
Silica-exposed workers showed significantly (p<0.05) increased levels of urinary TP, Malb, ALP, γ-GT, LDH, and KIM-1 compared with the comparison group. Among the silica-exposed group, increased urinary Si levels were positively and significantly correlated (Spearman's ρ>0.60, p<0.001 for all variables) with the elevated urinary proteins (including KIM-1) and enzymes levels. All measured urinary parameters were positively and significantly correlated (ρ>0.75, p<0.001 for all variables) with the duration of work among exposed subjects. No significant correlation was observed between the measured variables and the age of workers.

**CONCLUSION:**
There is associated subclinical glomerular and tubular affection among silica-exposed workers, which is related to the duration and intensity of exposure.

Authors: Mourad BH, Ashour YA
Cobalt-containing dust exposures: Prediction of whole blood and tissue concentrations using a biokinetic model

2020-03-16

Biokinetic models estimating cobalt (Co) tissue burden can help assess the potential for systemic effects. Such models, however, have not been used to estimate remote tissue concentrations associated with inhalation exposure to Co-containing dust in general environments, work spaces, or animal toxicity tests. We have therefore updated a Co biokinetic model previously developed for oral dosing to include the inhalation pathway by incorporating the International Commission on Radiological Protection (ICRP) Human Respiratory Tract Model. Further, data from animal studies allowed for characterization of testes Co tissue concentration supplementing previous predictions for the liver, heart and blood. Reasonable agreement (within a factor of two) was found between modeled and measured blood, liver, testes and tissue concentrations when animal doses were modeled using human equivalent concentrations to account for species differences in regional lung deposition. We applied the updated model to occupational inhalation exposure scenarios, and found that upper-bound plausible human systemic body burden associated with Co ingestion is much higher than the burden associated with Co inhalation. Chronic ingestion of Co at a previously proposed oral reference dose (RFD) of 0.03 mg/kg-day resulted in predicted tissue levels of 22-54 μg/L (blood), 0.01-0.02 μg/g (testes), and 0.2-0.5 μg/g (liver), which were at least 5-fold more than the systemic burden associated with various Co inhalation occupational exposure limits (OELs) of 0.1 mg/m³ or less (for 8 h/d and 5 d/w). Overall, our analysis indicated that Co-metal or dust induced systemic health effects, including myocardial damage, are unlikely for the inhalation pathway when personal exposures levels are below concentrations associated with local respiratory effects such as pulmonary fibrosis.

Authors: Unice KM, Kovochich M, Monnot AD

Respirator usage protects brain white matter from welding fume exposure: a pilot magnetic resonance imaging study of welders

2020-03-23

Welding fume exposure has been associated with structural brain changes and a wide variety of clinical and sub-clinical outcomes including cognitive, behavioral and motor abnormalities. Respirator use has been shown to decrease exposure to welding fumes; however, the associations between respirator use and health outcomes, particularly neurologic health, have been understudied. In this preliminary study, we used diffusion tensor imaging (DTI) to investigate the effectiveness of respirator use in protecting workers' white matter (WM) from the harmful effects related to welding fume exposure. Fractional anisotropy (FA), a common DTI measurement of water diffusion properties, was used as a marker of WM microstructure integrity. We hypothesized that FA in brain regions involved in motor and neurocognitive functions would differ between welders reporting respirator use compared to those not using a respirator.

We enrolled a pilot cohort of 19 welders from labor unions in the New York City area. All welders completed questionnaires to assess welding history and occupational health. All completed a DTI acquisition on a 3T Siemens scanner. Partial least squares discriminant analysis (PLS-DA), a bioinformatic analytical strategy, was used to model the divergence of WM microstructures in 48 regions defined by the ICBM-DTI-81 atlas between respirator users compared to non-users. This yielded an effective discrimination of respirator users from non-users, with the uncinate fasciculus, the cerebellar peduncle and the superior longitudinal fasciculus contributing most to the discrimination of these groups. These white matter tracts are involved in widespread motor and cognitive functions. To our knowledge, this study is the first to suggest a protective effect of respirator usage on brain white matter (WM) microstructure integrity.

We hypothesized that FA in brain regions involved in motor and neurocognitive functions would differ between welders reporting respirator use compared to those not using a respirator.


Environmental monitoring of PAHs exposure, biomarkers and vital status in Coke oven workers

2020-03-25

A follow-up study of a cohort of workers from a coke plant compared with a control group from the same industrial area was conducted in 2019. The recruitment and environmental and biomarker measurements were performed during 1993/1994. The environmental concentrations of environmental PAH levels were significantly higher in the coke oven workers than in the control group. The biomarkers of internal exposure, such as urinary benz(a)anthracene (BaA) and 3,4-benzpyrene (BaP) metabolites, were also significantly higher in the coke oven workers. The vital status, such as blood pressure, body mass index, and waist-to-hip ratio, were also significantly higher in the coke oven workers compared to the control group. These findings suggest that prolonged exposure to PAHs in the coke oven workers may have adverse health effects on their cardiovascular system.
The environmental concentrations of polycyclic aromatic hydrocarbons (PAH), B(a)P, pyrene and nitro-PAH were measured. Personal data were collected via an individual semi-structured questionnaire by a trained physician. All biomarkers were measured after a specific blood drawing for every test. Significant risks (ORs) were observed for nitro-PAH (≥0.12 µg/m³) [OR = 7.96 (1.01-62.82)], urinary 1-hydroxypyrene (1-OHpy) (≥0.99 µmoles/moles of creatinine) [OR = 11.71 (1.47-92.90)], PAH DNA adducts (P12) (≥2.69 adducts/10⁶ nucleotides) [OR = 5.46 (1.17-25.58)], total nitro-PAH hemoglobin adducts (≥161.68 fg/µg of Hb) [OR = 5.92 (1.26-27.86)], sister chromatid exchange (SCE) with TCR (≥377.84 SCE/cell chromosomes) [OR = 13.06 (3.95-93.10)], sister chromatid exchange with T (≥394.72 total SCE) [OR = 13.06 (3.95-93.10)], and sister chromatid exchange with X (≥8.19 mean SCE) [OR = 13.06 (3.95-93.10)]. Significant risk of death for all causes and chromosomal aberrations (48 h) (OR = 7.19 [1.19-43.44]) or micronuclei in culture at 48 h (OR = 3.86 [1.04-13.38]) were also found.

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