

# Bulletin Board

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## CHEMICAL EFFECTS

## Distribution, sources and ecological risks of PAHs and n-alkanes in water and sediments of typically polluted estuaries: Insights from the Xiaoqing River

2024-06-14

Seasonal water and sediment samples were collected from the Xiaoqing River estuary and the neighboring sea to study the spatial and temporal distributions, sources and ecological risks of polycyclic aromatic hydrocarbons (PAHs) and n-alkanes. The results showed significant spatial and temporal differences in the concentrations of PAHs and n-alkanes under the influence of precipitation, temperature, and human activities. The concentrations of PAHs in water were lower in the wet season than in the dry season, and those in sediments were higher in the wet season than in the dry season. The concentrations of n-alkanes were higher in the rainy season than in the dry season for both water and sediments. The spatial distributions of PAHs and n-alkanes were estuarine > offshore. The concentration ranges of  $\Sigma$ PAHs in water and sediments were 230.66-599.86 ng/L and 84.51-5548.62 ng/g, respectively, in the wet season and 192.46-8649.55 ng/L and 23.39-1208.92 ng/g, respectively, in the dry season. The proportion of three-ring PAHs in water (57.03% and 78.27% in the wet and dry seasons, respectively) was high, followed by two-ring PAHs (27.31% and 13.59% in the wet and dry seasons, respectively). The proportion of four-ring PAHs was higher in sediments (24.79% and 32.20% in the wet and dry seasons, respectively). The ecological risk of PAHs assessed using the toxicity equivalent quotient and risk quotient was at moderate to moderately high risk levels. The high concentration of n-alkane fraction C16 (611.65-75594.58 ng/L) in the water is indicative of petroleum or other fossil fuel inputs. The main peaks of n-alkanes in river sediments were C27, C29 and C31, indicating higher inputs of plant sources. The sediments in the estuary showed dominance of both short-chain C16 and long-chain C25-C31, indicating a combined input of higher plants and petroleum. The diagnostic ratios of PAHs and n-alkanes indicated that their sources were mainly oil/coal/biomass combustion and petroleum spills attributed to frequent vehicular, vessel and mariculture activities. Given the potential

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ecological risks of PAHs and n-alkanes in water and sediments, future studies should focus on their bioaccumulation and biotoxicity.

Authors: Feifei Zhang, Dong Zhang, Huawei Lou, Xiaoyue Li, Hongrui Fu, Xiaojun Sun, Peiyan Sun, Xiping Wang, Mutai Bao

Full Source: Journal of environmental management 2024 Jun 14:364:121471. doi: 10.1016/j.jenvman.2024.121471.

## Toxic elements identified in breast milk of mothers residing in water contaminated region of Sindh and their impact on infants' growth patterns: A case-control study

2024-06-12

Breast milk is a vital source of nutrition for breastfed infants, providing essential nutrients and elements but, in some cases, toxic ones. This is the first case-control study that investigated the elemental profile of breast milk samples collected from mothers residing in Matiari (Sindh), a region with insufficient industrial waste management, and its potential impact on infants' anthropometrics. Precisely, 62 milk samples, including 42 cases and 20 controls, were analyzed using the ICP-MS technique. Overall, six elements showed significance between the two groups, arsenic (As) was present at 0.68  $\mu$ g/L in cases and absent in controls, while lead (Pb) exhibited elevated concentrations in the case group at 4.56  $\mu$ g/L compared to 0.25  $\mu$ g/L in controls, well-known for their toxicity. Barium (Ba) and manganese (Mn) levels were also higher in cases, associated with reported health effects on child well-being. Essential elements molybdenum (Mo) and selenium (Se) were higher in the controls. Furthermore, the association of these metals with the child growth standards as per WHO guidelines was calculated. Linear regression analysis revealed As negatively associated with WAZ and WHZ scores, while Mo was positively associated with WAZ, WHZ, and HAZ scores. These findings highlight serious health concerns in the region, where toxic elements pervade drinking water and food sources. Immediate actions are imperative to maintain the wellness of future generations.

Authors: Nurmeen Adil, Syed Sibt-E-Hassan, Amna Jabbar Siddiqui, Zehra Jamil, Junaid Iqbal, Syed Asad Ali, Syed Ghulam Musharraf

Full Source: Environmental pollution (Barking, Essex : 1987) 2024 Jun 12:356:124368. doi: 10.1016/j.envpol.2024.124368.

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### ENVIRONMENTAL RESEARCH

#### The environment as the first victim: The impacts of the war on the preservation areas in Ukraine

2024-06-13

The war in Ukraine has had a devastating impact on the environment. Military actions have caused the release of hazardous substances into the environment, such as pollutants and toxic chemicals, that have contaminated the water, soil, and air, posing a threat to both human health and the environment. This has resulted in widespread destruction and contamination of natural habitats and resources and has disrupted wildlife populations and ecosystems. The impacts of military activity on the soils of protected areas are particularly critical, as they are the basis of biotic and landscape diversity and require special management and scientifically based monitoring measures even in peaceful conditions. In this context, this communication paper aims to provide an overview of the impacts of the war on the soils in four Ukrainian protected areas, namely Chernobyl Radiation and Ecological Biosphere Reserve; Desniansko-Starohutskyi National Nature Park; Holosiivskyi National Nature Park, and Hetmanskyi National Nature Park. To address these aspects, this paper combined GIS analysis and secondary data including soil samples obtained during field expeditions, to provide evidence of how ground battles, occupation, terrestrial land mines, and explosions can severely impact the soils. Practical and theoretical implications of the military actions are also discussed.

Authors: Walter Leal Filho, Mariia Fedoruk, João Henrique Paulino Pires Eustachio, Anastasiia Splodytel, Anatoliy Smaliychuk, Małgorzata Iwona Szykowska-Jóźwik

Full Source: Journal of environmental management 2024 Jun 13:364:121399. doi: 10.1016/j.jenvman.2024.121399.

#### Ecotoxicological risk of asphalt pavements to aquatic animals associated with pollutant leaching

2024-06-12

Contaminants such as heavy metals and polycyclic aromatic hydrocarbons (PAHs) can be released from asphalt pavement and transported through stormwater runoff to nearby water bodies, leading to water pollution and potential harm to living aquatic animals. This study characterizes the heavy metal and PAH leaching from various asphalt paving materials and their potential ecotoxicological effects on zebrafish *Danio rerio*. Artificial

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runoffs were prepared in the laboratory concerning the effects of water, temperature, and traffic. The concentrations of heavy metals and PAHs in the leachates were quantified, while the toxicity assessment encompassed mortality, metal stress, PAH toxicity, inflammation, carcinogenicity, and oxidative damage. Gene expressions of related proteins or transcription factors were assessed, including metallothionines, aryl hydrocarbon receptors, interleukin-1 $\beta$ , interleukin-10, nuclear factor- $\kappa$ B, tumor necrosis factor- $\alpha$ , tumor suppressor p53, heat shock protein 70, and reactive oxygen species (ROS). The findings demonstrate that leachates from asphalt pavements containing waste bottom ash, crumb rubber, or specific chemicals could induce notable stress and inflammation responses in zebrafish. In addition, potential carcinogenic effects and the elevation of ROS were identified within certain treatment groups. This study represents the first attempt to assess the ecotoxicity of pavement leachates employing a live fish model, thereby improving the current understanding of the environmental impact of asphalt pavements.

Authors: Fuliao Zou, Margaret M H Wu, Zhifei Tan, Guoyang Lu, Kevin W H Kwok, Zhen Leng

Full Source: The Science of the total environment 2024 Jun 12:944:173985. doi: 10.1016/j.scitotenv.2024.173985.

#### Preparation of porous biochar from fusarium wilt-infected banana straw for remediation of cadmium pollution in water bodies

2024-06-15

The problem of cadmium pollution and its control is becoming increasingly severe issue in the world. Banana straw is an abundant bio raw material, but its burning or discarding in field not only causes pollution but also spreads fusarium wilt. The objective of this paper is to utilize biochar derived from the wilt-infected banana straw for remediation of Cd(II) pollution while to eliminate the pathogen. The activity of wilt pathogen in biochar was determined by PDA petri dish test. The Cd(II) adsorption of the biochar was determined by batch adsorption experiments. The effects of KOH concentration (0.25, 0.5 and 0.75 M) on the physicochemical characteristics of the biochar were also observed by BET, SEM, FTIR, XRD and XPS. Results showed that pristine banana straw biochar (PBBC) did not harbor any pathogen. The specific surface area (SSA) and Cd(II) adsorption capacity of 0.75 M KOH modified banana straw biochar (MBBC0.75M) were increased by 247.2% and 46.1% compared to that of PBBC, respectively. Cd(II) adsorption by MBBC0.75M was suitable to be described by the pseudo-second-order kinetic model and Freundlich

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isotherm. After Cd(II) adsorption, the CdCO<sub>3</sub> were confirmed by XRD and observed through SEM. The weakness and shift of oxygen-containing functional groups in MBBC0.75M after Cd(II) adsorption implied that those groups were complexed with Cd(II). The results showed that pyrolysis could not only eliminate banana fusarium wilt, but also prepare porous biochar with the wilt-infected banana straw. The porous biochar possessed the potential to adsorb Cd(II) pollutants.

Authors: Chengxiang Gao, Yi Lan, Yaowei Zhan, Yuechen Li, Jiaquan Jiang, Yuanqiong Li, Lidan Zhang, Xiaolin Fan

Full Source: Scientific reports 2024 Jun 15;14(1):13821. doi: 10.1038/s41598-024-63954-4.

### PHARMACEUTICAL/TOXICOLOGY

#### Exploring the impact of pharmacist-supported medication reviews in dementia care: experiences of general practitioners and nurses

2024-06-14

Background: Dementia is a major global public health challenge, and with the growing elderly population, its prevalence is expected to increase in the coming years. In Sweden, municipalities are responsible for providing special housing for the elderly (SÄBO), which offers services and care for older individuals needing specific support. SÄBO is both the person's home and a care environment and workplace. Polypharmacy in patients with dementia is common and increases the risk of medication interactions. Involving clinical pharmacists in medication reviews has been shown to enhance medication safety and improve prescribing practices. However, the views of the standard care team involved in medication prescribing, administration, monitoring and documentation on integrating pharmacist services have received less attention. Thus, this study aims to explore how pharmacists' contributions can enhance medication safety, improve patient care efficiency, and potentially alleviate the workload of general practitioners for people with dementia living in special housing. Methods: This study has a descriptive qualitative study design using semi-structured interviews and qualitative content analysis. The study was conducted in a southern Swedish special housing and included nurses, assistant nurses, general practitioners (GPs), and a pharmacist. Due to the COVID-19 pandemic, interviews were conducted over the phone. The Swedish Ethical Review Authority approved the study.

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Results: The analysis revealed three main categories, and eleven subcategories: (1) Integrating multidisciplinary approaches for holistic dementia care, (2) Strengthening dementia care through effective medication management and (3) Advancing dementia care through pharmacist integration and role expansion. Nurses focused on non-pharmacological treatments, while GPs emphasized the importance of medication reviews in assessing the benefits and side-effects of prescribed medication. Pharmacists were valued for their reliable medication expertise, appreciated by GPs for saving time and providing recommendations prior to consultations with individuals with dementia and their next-of-kin. Although medication reviews were considered beneficial, there was skepticism about their ability to solve all medication-related problems associated with dementia care.

Conclusions: This study highlights the critical role pharmacists play in enhancing medication safety and patient care efficiency in special housing for individuals with dementia. Despite the value of their contributions, communication barriers within healthcare teams pose significant challenges. Recognising potential pharmacist role expansion is essential to alleviate the workload of GPs and ensure effective collaborative practices for better patient outcomes.

Authors: Catharina Carlqvist, Mirjam Ekstedt, Elin C Lehnbohm

Full Source: BMC geriatrics 2024 Jun 14;24(1):520. doi: 10.1186/s12877-024-05124-9.

#### The Potential Impact of Oral Nicotine Pouches on Public Health: A Scoping Review

2024-06-17

Introduction: Oral nicotine pouches (ONPs) are a new class of nicotine products. This scoping review summarizes evidence on ONPs and explores their potential public health impact.

Aims and methods: We conducted a structured literature search for empirical studies across three electronic databases through January 10, 2024. Outcomes included ONP product characteristics, use patterns, beliefs and perceptions, toxicity, and marketing and sales.

Results: Sixty-two studies were included, 17 were industry-funded. Most studies were from the United States. While large variations across studies were observed in ONP youth prevalence estimates, nationally representative U.S. studies find current use at 1.5% and lifetime use below 2.5% through 2023. Between 35% and 42% of U.S. adolescents and young adults have heard of ONPs, and 9-21% of tobacco-naïve youth were susceptible to trying them. U.S. adult-use estimates varied widely (0.8%-

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3% current; 3%-16% lifetime use) and were limited to populations with a history of tobacco use. The chemical composition of ONPs suggests fewer harmful/potentially harmful compounds at lower levels than cigarettes and smokeless tobacco (SLT), except formaldehyde. Industry-funded studies find substantially less cytotoxicity compared to cigarettes and suggest that higher nicotine-strength ONPs can deliver nicotine at levels comparable to or higher than SLT or cigarettes, although with slower nicotine release than cigarettes. Evidence on the cytotoxicity of ONPs relative to SLT is mixed.

Conclusions: ONPs appear to be less toxic than cigarettes and deliver comparable nicotine, presenting an alternative for combustible product users, although key data are mainly available from industry-funded studies. Data from independent research is critically needed. Industry marketing of ONPs may encourage initiation in youth and situational and dual use in adults.

Implications: The review provides an initial assessment of the potential role of ONPs in harm reduction and aims to determine unintended consequences of their use (youth uptake and dual-use) and identify populations that disproportionately use the product. This information is essential for tobacco regulatory bodies in determining the net public health impact of nicotine pouches.

Authors: Nargiz Travis, Kenneth E Warner, Maciej L Goniewicz, Hayoung Oh, Radhika Ranganathan, Rafael Meza, Jamie Hartmann-Boyce, David T Levy  
Full Source: Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco 2024 Jun 17;ntae131. doi: 10.1093/ntr/ntae131.

## OCCUPATIONAL

### Evaluation of Heavy Metal and Specific Trace Elements Levels Among Fast-Food Workers and Their Susceptibility to Atherosclerosis

2024-06-15

Fast-food workers in Iraq face significant health risks due to exposure to heavy metals from fumes and dust during cooking activities. Heavy metals, such as lead (Pb), cadmium (Cd), and nickel (Ni), are toxic to cells even at low concentrations and can cause health risks, including atherosclerosis, due to oxidative stress and reduced antioxidant activity. To the best of our knowledge, this is the first study assess the levels of heavy metals in fast-food workers and investigate their potential link to

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atherosclerosis development by monitoring the levels of copper (Cu), zinc (Zn), magnesium (Mg), manganese (Mn), and iron (Fe). A total of 120 male participants aged between 20 and 40 years were included in the study, with 40 fast-food workers, 40 patients with atherosclerosis, and 40 healthy individuals evaluated. The levels of Pb, Cd, Ni, Cu, Zn, Mg, Mn, and Fe in all blood samples were determined using atomic absorption spectrometry. Results showed that the fast-food worker group had significantly higher levels of Pb, Cd, Cu, and Fe compared to the healthy control group, with increases of 57%, 75%, 30%, and 55%, respectively. Conversely, their levels of Zn and Mg were significantly lower, decreasing by 15% and 16%, respectively. On the other hand, the atherosclerosis patients' group had significantly higher levels of Pb, Cd, Cu, and Fe, with increases of 47%, 74%, 34%, and 28%, respectively, as well as significantly lower levels of Zn and Mg, decreasing by 17% and 21%, respectively, compared to the control group. These findings suggest that fast-food workers are at risk of developing atherosclerosis due to exposure to high levels of heavy metals and imbalances in essential trace elements. The results showed a significant increase in the levels of Pb and Cd in the sera of these workers, which was expected because of the long duration and high intensity of exposure to toxic heavy metals. This is a serious indicator that must be considered, as it has been previously established that increased levels of Pb and Cd in the body are linked to the risk of atherosclerosis. Additionally, an association between Pb and Cd levels and an imbalance in trace element levels (Cu, Zn, Mg, and Fe) were observed. The implementation of stricter regulations and guidelines for maintaining cleanliness and safety in fast-food restaurants may be crucial for protecting workers and preventing long-term health complications.

Authors: Falah S Al-Fartusie, Muntaha A Mohammed, Mohammed Z Thani, Safaa Kader, Roaa M Khadim  
Full Source: Biological trace element research 2024 Jun 15. doi: 10.1007/s12011-024-04262-w.

### Bioaerosol Exposures and Respiratory Diseases in Cannabis Workers

2024-06-15

Purpose of review: This review investigates occupational inhalation hazards associated with biologically derived airborne particles (bioaerosols) generated in indoor cannabis cultivation and manufacturing facilities.

Recent findings: Indoor cannabis production is growing across the US as are recent reports of respiratory diseases among cannabis workers,

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including occupational asthma morbidity and mortality. More information is needed to understand how bioaerosol exposure in cannabis facilities impacts worker health and occupational disease risk. Preliminary studies demonstrate a significant fraction of airborne particles in cannabis facilities are comprised of fungal spores, bacteria, and plant material, which may also contain hazardous microbial metabolites and allergens. These bioaerosols may pose pathogenic, allergenic, toxigenic, and pro-inflammatory risks to workers. The absence of multi-level, holistic bioaerosol research in cannabis work environments necessitates further characterization of the potential respiratory hazards and effective risk prevention methods to safeguard occupational health as the cannabis industry continues to expand across the US and beyond.

Authors: Tess Eidem, Tara Nordgren, Mark Hernandez

Full Source: Current allergy and asthma reports 2024 Jun 15. doi: 10.1007/s11882-024-01157-7.

### Occasional and constant exposure to dietary ethanol shortens the lifespan of worker honey bees

2024-06-17

Honey bees (*Apis mellifera*) are one of the most crucial pollinators, providing vital ecosystem services. Their development and functioning depend on essential nutrients and substances found in the environment. While collecting nectar as a vital carbohydrate source, bees routinely encounter low doses of ethanol from yeast fermentation. Yet, the effects of repeated ethanol exposure on bees' survival and physiology remain poorly understood. Here, we investigate the impacts of constant and occasional consumption of food spiked with 1% ethanol on honey bee mortality and alcohol dehydrogenase (ADH) activity. This ethanol concentration might be tentatively judged close to that in natural conditions. We conducted an experiment in which bees were exposed to three types of long-term diets: constant sugar solution (control group that simulated conditions of no access to ethanol), sugar solution spiked with ethanol every third day (that simulated occasional, infrequent exposure to ethanol) and daily ethanol consumption (simulating constant, routine exposure to ethanol). The results revealed that both constant and occasional ethanol consumption increased the mortality of bees, but only after several days. These mortality rates rose with the frequency of ethanol intake. The ADH activity remained similar in bees from all groups. Our findings indicate that exposure of bees to ethanol carries harmful effects that accumulate over time. Further

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research is needed to pinpoint the exact ethanol doses ingested with food and exposure frequency in bees in natural conditions.

Authors: Monika Ostap-Chec, Daniel Bajorek, Weronika Antoł, Daniel Stec, Krzysztof Miler

Full Source: Journal of comparative physiology. B, Biochemical, systemic, and environmental physiology 2024 Jun 17. doi: 10.1007/s00360-024-01571-3.