

# Bulletin Board

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## CHEMICAL EFFECTS

**Advances in polychlorinated biphenyls-induced female reproductive toxicity**

2024-02-01

Polychlorinated biphenyls (PCBs) are a class of endocrine-disrupting chemicals (EDCs) widely present in the environment. PCBs have been of concern due to their anti/estrogen-like effects, which make them more toxic to the female reproductive system. However, there is still a lack of systematic reviews on the reproductive toxicity of PCBs in females, so the adverse effects and mechanisms of PCBs on the female reproductive system were summarized in this paper. Our findings showed that PCBs are positively associated with lower pregnancy rate, hormone disruption, miscarriage and various reproductive diseases in women. In animal experiments, PCBs can damage the structure and function of the ovaries, uterus and oviducts. Also, PCBs could produce epigenetic effects and be transferred to the offspring through the maternal placenta, causing development retardation, malformation and death of embryos, and damage to organs of multiple generations. Furthermore, the mechanisms of PCBs-induced female reproductive toxicity mainly include receptor-mediated hormone disorders, oxidative stress, apoptosis, autophagy, and epigenetic modifications. Finally, we also present some directions for future research on the reproductive toxicity of PCBs. This detailed information provided a valuable reference for fully understanding the reproductive toxicity of PCBs.

Authors: Chunrui Wu, Xingde Du, Haohao Liu, Xinghai Chen, Kangfeng Ge, Ruiyang Meng, Zongxin Zhang, Huizhen Zhang

Full Source: The Science of the total environment 2024 Feb 1:170543. doi: 10.1016/j.scitotenv.2024.170543.

**The formation, reactivity, and fate of oxygen-containing organic compounds in petroleum-contaminated groundwaters: A state of the science review and future research directions**

2024-02-02

Hydrocarbon (HC) contamination in groundwater (GW) is a widespread environmental issue. Dissolved hydrocarbons in water are commonly utilized as an energy source by natural microbial communities, which can produce water soluble intermediate metabolite compounds, herein referred to as oxygen containing organic compounds (OCOCs),

before achieving complete mineralization. This review aims to provide a comprehensive assessment of the literature focused on the state of the science for OCOCs detected and measured in GW samples collected from petroleum contaminated aquifers. In this review, we discuss and evaluate two hypotheses investigating OCOC formation, which are major points of contention in the freshwater oil spill community that need to be addressed. We reviewed over 150 articles compiling studies investigating OCOC formation and persistence to uncover knowledge gaps in the literature and studies that recommend quantitative and qualitative measurements of OCOCs in petroleum-contaminated aquifers. This review is essential because no consensus exists regarding specific compounds and related concerns. We highlight the knowledge gaps to progressing the discussion of hydrocarbon conversion products.

Authors: Phoebe Zito, Natasha Sihota, Rachel E Mohler, David C Podgorski  
Full Source: The Science of the total environment 2024 Feb 2:170619. doi: 10.1016/j.scitotenv.2024.170619.

**Differences in toxicity induced by the various polymer types of nanoplastics on HepG2 cells**

2024-02-02

The problem of microplastics (MPs) contamination in food has gradually come to the fore. MPs can be transmitted through the food chain and accumulate within various organisms, ultimately posing a threat to human health. The concentration of nanoplastics (NPs) exposed to humans may be higher than that of MPs. For the first time, we studied the differences in toxicity, and potential toxic effects of different polymer types of NPs, namely, polyethylene terephthalate (PET), polyvinyl chloride (PVC), and polystyrene (PS) on HepG2 cells. In this study, PET-NPs, PVC-NPs, and PS-NPs, which had similar particle size, surface charge, and shape, were prepared using nanoprecipitation and emulsion polymerization. The results of the CCK-8 assay showed that the PET-NPs and PVC-NPs induced a decrease in cell viability in a concentration-dependent manner, and their lowest concentrations causing significant cytotoxicity were 100 and 150 µg/mL, respectively. Moreover, the major cytotoxic effects of PET-NPs and PVC-NPs at high concentrations may be to induce an increase in intracellular ROS, which in turn induces cellular damage and other toxic effects. Notably, our study suggested that PET-NPs and PVC-NPs may induce apoptosis in HepG2 cells through the mitochondrial apoptotic pathway. However, no relevant cytotoxicity, oxidative damage, and apoptotic toxic effects were detected in HepG2 cells with exposure to PS-NPs. Furthermore, the analysis of transcriptomics data suggested that PET-

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NPs and PVC-NPs could significantly inhibit the expression of DNA repair-related genes in the p53 signaling pathway. Compared to PS-NPs, the expression levels of lipid metabolism-related genes were down-regulated to a greater extent by PET-NPs and PVC-NPs. In conclusion, PET-NPs and PVC-NPs were able to induce higher cytotoxic effects than PS-NPs, in which the density and chemical structure of NPs of different polymer types may be the key factors causing the differences in toxicity.

Authors: Lihua Ma, Zijie Wu, Zifan Lu, Linhong Yan, Xiaoling Dong, Zhenqing Dai, Ruikun Sun, Pengzhi Hong, Chunxia Zhou, Chengyong Li  
Full Source: The Science of the total environment 2024 Feb 2:170664. doi: 10.1016/j.scitotenv.2024.170664.

## ENVIRONMENTAL RESEARCH

## The effects of environmental changes on the endocrine regulation of feeding in fishes

2023-03-25

Fishes are exposed to natural and anthropogenic changes in their environment, which can have major effects on their behaviour and their physiology, including feeding behaviour, food intake and digestive processes. These alterations are owing to the direct action of environmental physico-chemical parameters (i.e. temperature, pH, turbidity) on feeding physiology but can also be a consequence of variations in food availability. Food intake is ultimately regulated by feeding centres of the brain, which receive and process information from endocrine signals from both brain and peripheral tissues such as the gastrointestinal tract. These endocrine signals stimulate or inhibit food intake, and interact with each other to maintain energy homeostasis. Changes in environmental conditions might change feeding habits and rates, thus affecting levels of energy stores, and the expression of endocrine appetite regulators. This review provides an overview of how environmental changes and food availability could affect feeding and these endocrine networks in fishes. This article is part of the theme issue 'Endocrine responses to environmental variation: conceptual approaches and recent developments'.

Authors: Helene Volkoff

Full Source: Philosophical transactions of the Royal Society of London. Series B, Biological sciences 2024 Mar 25;379(1898):20220503. doi: 10.1098/rstb.2022.0503.

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## Contaminant dynamics in honey bees and hive products of apiaries from environmentally contrasting Argentinean regions

2024-01-31

Argentina is a leading honey producer and honey bees are also critical for pollination services and wild plants. At the same time, it is a major crop producer with significant use of insecticides, posing risks to bees. Therefore, the presence of the highly toxic insecticide chlorpyrifos, and forbidden contaminants (organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs)) was investigated in honey bee, beebread, wax and honey samples in apiaries from three contrasting regions of Argentina. Chlorpyrifos was detected in all samples with higher levels during period 1 (spring) in contrast to period 2 (fall), agreeing with its season-wise use in different crops, reaching 3.05 ng/g in honey bees. A subsequent first-tier pesticide hazard analysis revealed that it was relevant to honey bee health, mainly due to the high concentrations found in wax samples from two sites, reaching 132.4 ng/g. In addition, wax was found to be the most contaminated matrix with a prevalence of OCPs ( $\Sigma$ OCPs 58.23-172.99 ng/g). Beebread samples showed the highest concentrations and diversity of pesticide residues during period 1 (higher temperatures). A predominance of the endosulfan group was registered in most samples, consistent with its intensive past use, especially in Central Patagonia before its prohibition. Among the industrial compounds, lighter PCB congeners dominated, suggesting the importance of atmospheric transport. The spatio-temporal distribution of pesticides shows a congruence with the environmental characteristics of the areas where the fields are located (i.e., land use, type of productive activities and climatic conditions). Sustained monitoring of different pollutants in beekeeping matrices is recommended to characterize chemical risks, assess the health status of honey bee hives and the pollution levels of different agroecosystems. This knowledge will set a precedent for South America and be helpful for actions focused on the conservation of pollination services, apiculture and ecosystems in Argentina.

Authors: Agustina Villalba, Franco Cecchetto, Nicolas D Vazquez, Leonardo Amarilla, Cristina L Ramirez, Leonardo Galetto, Matías Maggi, Karina S B Miglioranza

Full Source: Environmental research 2024 Jan 31:1 18306. doi: 10.1016/j.envres.2024.118306.

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Authors: Helene Volkoff

Full Source: Philosophical transactions of the Royal Society of London. Series B, Biological sciences 2024 Mar 25;379(1898):20220503. doi: 10.1098/rstb.2022.0503.

## PHARMACEUTICAL/TOXICOLOGY

### Maternal occupational exposure to carbonaceous nanoscale particles and neurodevelopmental outcomes in early childhood: Analysis of the French Longitudinal Study of children - Elfe study

2024-02-01

Objective: To investigate the association between occupational exposures to carbonaceous unintentionally emitted nanoscale particles (UNPs) during pregnancy and the child's language development and behaviour at two years old.

Methods: Using data from the French Longitudinal Study of Childhood - ELFE, we selected mothers who worked during pregnancy and their children. Exposure to carbonaceous UNPs was assessed by the MatPUF

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(job-exposure matrix for ultrafine particles). Children's lexical development was analysed using 'the Mac Arthur - Bates communicative development inventories-words and sentences-short form' (MB-CDI) in a multivariate binary logistic regression. Their risk for autism spectrum disorders was studied using 'the Modified-CHecklist for Autism in Toddler' (M-CHAT) according to the recommended thresholds (low risk = 0-2; intermediate risk = 3-6 and high risk = 7-23) in unordered multinomial logistic regression models.

Results: Maternal occupational exposure to carbonaceous UNPs was associated with delayed child language development (OR<sub>adj</sub>: 1.34; 95% CI: 1.00, 1.80) but not with behavioural disorders (autism spectrum disorders) at two years old.

Conclusion: This is the first epidemiological study to show a significant association between maternal occupational exposure to carbonaceous nanoscale particles and child language development at 2 years old.

Authors: Guyguy Manangama, Cédric Galera, Sabyne Audignon-Durand, Céline Gramond, Marie Tartaglia, Cécile Zaros, Raphaëlle Teyssere, Patrick Brochard, Loïc Sentilhes, Fleur Delva

Full Source: Environmental research 2024 Feb 1:118364. doi: 10.1016/j.envres.2024.118364.

## OCCUPATIONAL

### Exposure assessment of plastics, phthalate plasticizers and their transformation products in diverse bio-based fertilizers

2024-01-31

Bio-based fertilizers (BBFs) produced from organic waste have the potential to reduce societal dependence on limited and energy-intensive mineral fertilizers. BBFs, thereby, contribute to a circular economy for fertilizers. However, BBFs can contain plastic fragments and hazardous additives such as phthalate plasticizers, constituting a risk for agricultural soils and the environment. This study assesses the exposure associated with plastic and phthalates in BBFs from three types of organic wastes: agricultural and food industry waste (AgriFoodInduWaste), sewage sludge (SewSludge), and biowaste (i.e., garden, park, food and kitchen waste). The wastes were associated with various treatments like drying, anaerobic digestion, and vermicomposting. The number of microplastics (0.045-5 mm) increased from AgriFoodInduWaste-BBFs (15-258 particles g<sup>-1</sup>), to SewSludge-BBFs (59-1456 particles g<sup>-1</sup>) and then to Biowaste-BBFs

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(828-2912 particles g<sup>-1</sup>). Biowaste-BBFs mostly contained packaging plastics (e.g., polyethylene terephthalate), with the mass of plastic (>10 g kg<sup>-1</sup>) exceeding the EU threshold (3 g kg<sup>-1</sup>, plastics >2 mm). Other BBFs mostly contained small (< 1 mm) non-packaging plastics (e.g., copolymers) in amounts below the EU limit. The calculated numbers of microplastics entering agricultural soils via BBF application was high (107-1010 microplastics ha<sup>-1</sup>y<sup>-1</sup>), but the mass of plastic released from AgriFoodInduWaste-BBFs and SewSludge-BBFs was limited (< 1 and <7 kg ha<sup>-1</sup>y<sup>-1</sup>) compared to Biowaste-BBFs (95-156 kg ha<sup>-1</sup>y<sup>-1</sup>). The concentrations of di(2-ethylhexyl)phthalate (DEHP; < 2.5 mg kg<sup>-1</sup>) and phthalate transformation products (< 8 mg kg<sup>-1</sup>) were low (< benchmark of 50 mg kg<sup>-1</sup> for DEHP), attributable to impact of current phase-out of DEHP as well as phthalate degradation during waste treatment. The Biowaste-BBF exposed to vermicomposting indicated that worms accumulated phthalate transformation products (4 mg kg<sup>-1</sup>). These results are overall positive for the implementation of the studied AgriFoodInduWaste-BBFs and SewSludge-BBFs. However, the safe use of Biowaste-BBFs requires reducing plastic use and improving sorting methods to minimize contamination of agricultural soils and reduce environmental impact.

Authors: Nicolas Estoppey, Gabriela Castro, Gøril Aasen Slinde, Caroline Berge Hansen, Mari Engvig Løseth, Katinka Muri Krahn, Viona Demmer, Jørgen Svenni, Teresa-Van-Anh Thi Tran, Alexandros G Asimakopoulos, Hans Peter H Arp, Gerard Cornelissen

Full Source: The Science of the total environment 2024 Jan 31:170501. doi: 10.1016/j.scitotenv.2024.170501.

### Occupational Therapy Practice Guidelines for Adults Living With Alzheimer's Disease and Related Neurocognitive Disorders

2024-01-01

Importance: There are currently 55 million adults living with declining functional cognition-altered perception, thoughts, mood, or behavior-as the result of Alzheimer's disease (AD) and related neurocognitive disorders (NCDs). These changes affect functional performance and meaningful engagement in occupations. Given the growth in demand for services, occupational therapy practitioners benefit from consolidated evidence of effective interventions to support adults living with AD and related NCDs and their care partners.

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Objective: These Practice Guidelines outline effective occupational therapy interventions for adults living with AD and related NCDs and interventions to support their care partners.

Method: We synthesized the clinical recommendations from a review of recent systematic reviews.

Results: Twelve systematic reviews published between 2018 and 2021 served as the foundation for the practice recommendations.

Conclusion and recommendations: Reminiscence, exercise, nonpharmacological behavioral interventions, cognitive therapy, sensory interventions, and care partner education and training were found to be most effective to support adults living with AD and related NCDs.

Plain-Language Summary: These Practice Guidelines provide strong and moderate evidence for occupational therapy practitioners to support adults living with Alzheimer's disease (AD) and related neurocognitive disorders (NCDs) and their care partners. They provide specific guidance for addressing the decline in cognition, behavioral and psychological symptoms of dementia, and pain experience of adults living with AD and related NCDs. The guidelines also describe interventions to support care partners. With support from the evidence, occupational therapy practitioners are better equipped to address the unique needs of adults living with AD and related NCDs and their care partners.

Authors: Stacy Smallfield, Lizabeth Metzger, Melissa Green, Laura Henley, Elizabeth K Rhodus

Full Source: The American journal of occupational therapy: official publication of the American Occupational Therapy Association 2024 Jan 1;78(1):7801397010. doi: 10.5014/ajot.2024.078101.

### Incidences of Helicobacter infection in pigs and tracing occupational hazard in pig farmers

2024-01-15

Helicobacter species (spp.) is a gram-negative spiral-shaped motile bacterium that causes gastritis in pigs and also colonizes in the human stomach. The present study assessed the prevalence of Helicobacter spp. in pig gastric mucosa and the stool of pig farmers in Assam, India. A total of 403 stomach samples from pig slaughter points, 74 necropsy samples of pigs from pig farms, and 97 stool samples from pig farmers were collected. Among the pig stomach samples, 43 (20.09%) of those with gastritis showed the presence of Gram-negative, spiral-shaped organisms, while only 3.04% of stomach samples without lesions had these organisms. Scanning Electron Microscopy (SEM) of urease-positive stomach samples revealed tightly coiled Helicobacter bacteria in the mucus lining.

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Histopathological examination showed chronic gastritis with hemorrhagic necrosis, leucocytic infiltration, and lymphoid aggregates. PCR confirmed the presence of *Helicobacter suis* in 19.63% of pig stomach samples and 2.08% of pig farmer stool samples. Additionally, 3.12% of the stool samples from pig farmers were positive for *Helicobacter pylori*. Phylogenetic analysis revealed distinct clusters of *Helicobacter suis* with other *Helicobacter* spp. These findings highlight the prevalence of *Helicobacter* in both pig gastric mucosa and pig farmer stool. The findings highlight the need for improved sanitation and hygiene practices among pig farmers to minimize the risk of *Helicobacter* infection in humans.

Authors: Seema Rani Pegu, Joyshikh Sonowal, Swaraj Rajkhowa, Pranab Jyoti Das, Gyanendra Singh Sengar, Rajib Deb, Manjisa Choudhury, Naba Jyoti Deka, Souvik Paul, Juwar Doley, Dilip Kumar Sarma, Samir Das, N H Mohan, Rajendran Thomas, Vivek Kumar Gupta

Full Source: Comparative immunology, microbiology and infectious diseases 2024 Jan 15:106:102128. doi: 10.1016/j.cimid.2024.102128.