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CHEMICAL EFFECTS

Is Reproductive Toxicity of Bisphenols an Adverse Outcome from Insulin Homeostasis Disruption in Fish?

2025-12-05

Beyond regulating glucose metabolism and energy homeostasis, insulin dysregulation impairs mammalian fertility by disrupting hormone secretion, but its role in fish reproduction remains poorly characterized. Here, a transcriptome-based systematic review of 19 studies revealed that exposure to pollutants (bisphenols) caused dual changes in insulin signaling and reproductive processes across species, suggesting a potential mechanistic link. Bisphenols (BPs) are a typical class of endocrine-disrupting chemicals. Molecular docking assessed binding affinities of ten BPs to insulin and its receptor across species, with BPZ and BPM showing stronger affinities than BPA. Juvenile Chinese rare minnows (Gobiocypris rarus) were exposed to BPA, BPZ, or BPM (1-100 μg/L) for 60 days. The reproductive development including reduced gonadosomatic index, inhibited oogenesis, and enhanced spermatogenesis were impaired at all treatments. Moreover, insulin-related gene expression along the HPG axis was altered, accompanied by suppressed insulin and disrupted sex hormone levels. Spearman correlation analysis revealed strong correlations between insulin and HPG axis hormones in males (r = 0.41 -0.90, p = 0.02-0.21) and fair correlations in females (r = 0.48-0.61, p = 0.11-0.23). Those findings indicated that bisphenols-induced reproductive toxicity maybe mediated by insulin homeostasis disruption.

Authors: Zhitong Li, Xiangsheng Hong, Wang Liu, Le Zhang, Juan Wang, Wei Sang, Saihong Yan, Jinmiao Zha

Full Source: Environmental pollution (Barking, Essex : 1987) 2025 Dec 5:127495. doi: 10.1016/j.envpol.2025.127495.

Impacts of the 2024 flash flood on water quality, pathogenic bacteria and organic contaminant risks in the Albufera wetland (Valencia, Spain)

2025-12-04

Climate change is increasing flash flood frequency and intensity around the globe, which can contribute to the mobilization of urban and agricultural contaminants into aquatic ecosystems. In October 2024, a massive flash flood affected the Valencia region (Spain), which discharged contaminated water into the Albufera Natural Park (ANP), a protected Mediterranean wetland. In this study we provide one of the

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most comprehensive assessments to characterize the contamination produced by a flash flood event in downstream aquatic ecosystems. We evaluated physical-chemical parameters, pathogenic bacteria, and 241 organic contaminants, including pesticides (PEST), pharmaceuticals and personal care products (PPCPs), perfluoroalkyl substances (PFAS), organophosphorus flame retardants (OPFRs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs), polychlorinated dibenzo-p-dioxins (PCDDs), and polychlorinated dibenzofurans (PCDFs), in 15 sampling sites along the ANP. Our study reveals an increase of pathogenic bacteria and chemical exposure concentrations in the north-west areas of the ANP, correlating with elevated ammonia and reduced oxygen levels. Comparison with pre-flood data revealed significant concentration increases for PPCPs, PFAS, PAHs, and OPFRs, attributed to wastewater treatment failures and urban/industrial chemical mobilization. Several pollutants were found to exceed established ecological protection thresholds, with the most significant risks identified for ibuprofen, PFOS, and fluoranthene in water samples, along with 13 sediment-associated contaminants (including PFOS and several PESTs and PPCPs), which require further monitoring and investigation.

Authors: Andreu Rico, Antonio Picazo, Jhesibel Chavez, Julian Campo, Pere Colomer-Vidal, Juan Muñoz-Arnanz, Begoña Jiménez, Cristiana Rizzi, Lorenzo Federico, Sara Villa, Jose Francisco Palacios, Carlos Rochera, Pablo Amador, Antonio Camacho

Full Source: Environmental research 2025 Dec 4:123515. doi: 10.1016/j.envres.2025.123515.

Toxicity comparison of avermectins, chlorantraniliprole and deltamethrin on Procambarus clarkii: Histopathology, apoptosis, antioxidation, transcriptome response and intestinal microflora

2026-01

Rice-crayfish farming is currently an important ecological farming model for Procambarus clarkii, achieving co-cultivation of animals and plants, which carries great importance for the development of sustainable agriculture. Widely used pesticides in rice cultivation can effectively control the pests, weeds, and diseases. However, it may also pose a threat to the health of P. clarkii through their residues in water. To assess the toxicity of pesticide residues to P. clarkii, the effects of acute exposure for 96 h on P. clarkii were investigated, from the aspects of histopathology, apoptosis, antioxidation, transcriptome response, and intestinal

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microbiota, using the three pesticides including avermectins (AVMs, biotic pesticide), chlorantraniliprole (CAP, low toxicity chemical pesticide) and deltamethrin (DM, high toxicity chemical pesticide) at the dose of 1 % of 96 h LC50 for each one. Relative to the control (CON) group, distinct pathological damage was observed in the hepatopancreatic and intestinal tissue structure of P. clarkii in the AVMs, CAP and DM groups, including lumen enlargement, vacuolization, epithelial necrosis, and reduced villus height and muscle thickness. Apoptosis-related indicators, like caspase-3 and p53 were significantly higher, while BI-1 expression lower in the pesticide-treated groups. In all the pesticide-treated groups, oxidative stress was evident, as indicated by increased oxygen species (ROS) and malondialdehyde (MDA) levels, along with decreased the activities of superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GSH-Px) and total antioxidant capacity (T-AOC) in both hepatopancreas and intestine. Transcriptomic analysis identified differentially expressed genes (DEGs) enriched in immune and metabolic pathways, notably the phagosome pathway, across all pesticide treatments. Integration with intestinal microbiota profiling revealed shifts in dominant bacterial phyla in the pesticide-treated groups relative to the CON group, which included a decline in Proteobacteria and a rise in Firmicutes, Klebsiella, and Aeromonas. Correlation analysis suggested that alterations in intestinal microbiota were closely linked to the expression of phagosome-related DEGs, such as TUBA, TUBB, F-actin, and cathepsin L. These findings highlight the disruption of intestinal and hepatic homeostasis in P. clarkii under pesticide exposure and provide insight into host-microbiota interactions at the molecular level.

Authors: Qinglin Liu, Yongkang Feng, Bingtao Dai, Lili Shi, Shuang Zhang
Full Source: Pesticide biochemistry and physiology 2026 Jan;216(Pt 2):106815. doi: 10.1016/j.pestbp.2025.106815.

Comparing the toxicity of nitrate between different species of subterranean Niphargus amphipods

2025-12-05

This study investigates the sensitivity of subterranean amphipods of the genus Niphargus to nitrate pollution, focusing on understanding possible differences between cave-dwelling and spring-dwelling species. Five ecologically distinct subterranean crustacean species of the genus Niphargus were studied, three from springs at the interface between surface and subterranean ecosystems (Niphargus timavi, Niphargus spinulifemur, Niphargus sphagnicolus) and two from cave streams (Niphargus stygius, Niphargus podpecanus), together with

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Daphnia magna for comparative toxicity assessment. The organisms were exposed to nitrate for 72 h, 96 h and 21 days, followed by a 96-hour recovery period in a nitrate-free medium. In contrast to initial hypothesis, the results showed that nitrate did not induce immobility or mortality to any Niphargus species at concentrations higher than those environmentally relevant. The average 21 d LC50 values determined for different Niphargus sp. were 1735-4266 mg NO3- /L. No significant differences in nitrate sensitivity were found between cave-dwelling and spring-dwelling species. In addition, all species tested showed high recovery rates, regardless of their ecological origin. These results challenge the assumption that subterranean species are inherently more susceptible to chemical stressors due to their lower metabolic rate and lower detoxification capacities. This study highlights the importance of evaluating species-specific traits rather than relying solely on habitat-related generalizations. Although nitrate did not cause toxic effects in this context, potential long-term risks to groundwater ecosystems, such as effects on reproductive success and population dynamics, remain a concern. Comparing the sensitivity of Niphargus and D. magna after 72 h of exposure, N. timavi and N. stygius were more sensitive than D. magna, while N. sphagnicolus was similarly sensitive. These results suggest that tests on subterranean species should be performed to provide a more holistic understanding on the pollutant hazard for subterranean environment.

Authors: Anita Jemec Kokalj, Cene Fišer, Maruša Poje, Igor Zelnik, Ester Premate, Tiziana Di Lorenzo
Full Source: Ecotoxicology and environmental safety 2025 Dec 5:309:119509. doi: 10.1016/j.ecoenv.2025.119509.

ENVIRONMENTAL RESEARCH

Air pollution exposure modes, smoking and genetic risk with chronic respiratory diseases: a prospective study

2025-12-05

Previous studies often focused on single pollutant source, failing to replicate real-world exposure scenarios for chronic respiratory disease (CRD) risk. We aimed to explore the mixed exposure patterns of CRD risk factors and investigate interactions with smoking and genetic risk. We identified air pollution exposure modes using latent class analysis (LCA) in the UK Biobank. Cox model assessed associations between exposure modes and lung cancer (LC), idiopathic pulmonary fibrosis (IPF), chronic obstructive pulmonary disease (COPD) and asthma. Interactions among

Previous studies often focused on single pol-lutant source, failing to replicate real-world exposure scenarios for chronic respiratory disease (CRD) risk.

exposure modes, smoking and genetic risk were analyzed. LCA divided participants into five groups, and hazard ratios (HRs) for "High air pollution" group were 1.28 for LC (95% CI: 1.08-1.52), 1.23 for IPF (95% CI: 1.03-1.48), 1.28 for COPD (95% CI: 1.17-1.39) and 1.09 for asthma (95% CI: 1.01-1.18). Significant additive interactions between high air pollution and smoking were observed for LC and COPD. Individuals with high genetic risk exposed to both smoking and high air pollution showed the relative excess risk due to interaction (RERI) of 2.74 for LC, 3.93 for IPF, and 1.68 for COPD. Smoking and air pollution together accounted for over 40% of LC, IPF and COPD cases. Our findings highlight the complex interplay between environmental air pollution, smoking, and genetic risk in CRD development in real-world exposure scenarios.

Authors: Ting Wang, Linfang Lyu, Ru Yuan, Lei Lei, Fanqing Meng, Meng Zhu, Weiwei Duan

Full Source: NPJ primary care respiratory medicine 2025 Dec 5. doi: 10.1038/s41533-025-00469-z.

PHARMACEUTICAL/TOXICOLOGY

Long-term ozone exposure and attention-deficit/hyperactivity disorder symptoms in school-aged children: Findings from a large multi-city study in China

2025-12-03

Evidence on the association between ambient ozone (O3) exposure and attention-deficit/hyperactivity disorder (ADHD) in children was limited and inconsistent. To address this gap, we conducted a large-scale study involving 179,661 school-aged children across 14 cities in three regions of China between 2012 and 2018. ADHD symptoms were assessed using parent-reported Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition criteria. A well-validated spatiotemporal model at 1 × 1 km resolution was employed to estimate four-year average O3 concentrations at each participant's home and school addresses. We applied generalized linear mixed models adjusted for a range of potential confounders to examine the associations and explore potential effect modifiers. The prevalence of ADHD symptoms was 5.8 %. Higher O3 exposure was positively associated with ADHD symptoms. Specifically, the odds ratio of ADHD symptoms was 1.24 times greater (95 % confidence interval [CI]: 1.21, 1.26) per interquartile range (7.0 μg/m3) increment in home-school O3 concentration. The association was similar after adjustment for other air pollutants and greenness, as well as in sensitivity analyses.

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Notably, regional heterogeneity was observed, with a stronger association in the southeastern region. Additionally, larger estimates of O3 were found among older children and those exposed to low temperature, low humidity, and low greenness. Our findings from the largest study in China to date provide compelling evidence that long term exposure to O3 is associated with an increased risk of ADHD symptoms in children, highlighting the need for public health policies to mitigate O3 pollution for the protection of child neurodevelopment.

Authors: Zhao-Huan Gui, Wan-Ting He, Yun-Ting Zhang, Joachim Heinrich, Michael S Bloom, Shao Lin, Bin Jalaludin, Mohammed Zeeshan, Lidia Morawska, Tian-Yu Zhao, Shyamali Dharmage, Luke Knibbs, Jing-Wen Huang, Li-Xia Liang, Wen-Wen Bao, Li-Zi Lin, Yang Zhou, Li-Wen Hu, Wei-Zheng Zhang, Hui Zhou, Ru-Qing Liu, Hua Zhang, Guang-Hui Dong

Full Source: Journal of hazardous materials 2025 Dec 3:501:140709. doi: 10.1016/j.jhazmat.2025.140709.

OCCUPATIONAL

Occupational exposure to phthalate esters and systemic clinical changes in municipal sanitation workers: Human Biomonitoring and Network Analysis approach

2025-12-04

Continuous exposure to products containing phthalate acid esters (PAEs) has generated concerns regarding their impact on human health. This study was aimed at evaluating occupational exposure to PAEs metabolites among 90 municipal waste collection workers compared to 90 staff involved in janitorial duties across academic, administrative, and institutional areas (as a control group). Blood serum samples were analyzed to quantify multiple PAEs metabolites, alongside assessments of hematological, biochemical, inflammatory, oxidative stress, liver, thyroid, and kidney function biomarkers. Results showed significantly higher PAEs metabolite levels in exposed workers (total PAEs mean ± standard deviation: 25.66 ± 12.81 μg/L vs. 15.03 ± 5.14 μg/L, $p < 0.001$), accompanied by alterations in blood indices-including decreased white blood cells (WBC) and hemoglobin (HB), elevated red blood cells (RBC) and eosinophils-and elevated liver enzymes, thyroid hormones, and inflammatory markers such as the inflammatory cytokines tumor necrosis factor-alpha (TNF-α) and interleukin-6 (IL-6). The findings suggest that PAEs' metabolite levels are largely unaffected by demographic and lifestyle factors, highlighting occupational exposure as the predominant source in

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this group. Network analysis revealed that occupational exposure to PAEs, including Mono(2-ethylhexyl) phthalate (MEHP), in municipal sanitation workers is associated with significant alterations in neutrophils, 8-hydroxy-2′-deoxyguanosine, (OHdG8), thyroid parameters (triiodothyronine (T3) and thyroxine (T4), prothrombin time)PT(), and hematological factors (albumin, mean corpuscular hemoglobin concentration)MCHC(), and partial thromboplastin time (PTT)). These findings highlight the impact of occupational PAEs exposure on multiple physiological systems and underscore the need for preventive measures and continuous health monitoring in this population.

Authors: Mahbubeh Tangestani, Niloufar Borhani Yazdi, Hossein Arfaeinia, Farshid Soleimani, Zivar Zanganeh, Sima Afrashteh, Akram Farhadi, Nazilla Moftian, Maryam Mansouri, Shahram Zare

Full Source: Environmental pollution (Barking, Essex: 1987) 2025 Dec 4:127494. doi: 10.1016/j.envpol.2025.127494.

Micronucleus frequency in buccal cells increases with urinary titanium concentrations and oxidative stress biomarkers among subway workers

2025-12-03

The micronucleus (MN) assay in buccal cells is a widely used, non-invasive biomarker for detecting genotoxic effects in human populations. However, its application in assessing dose-response relationships to particulate matter exposure remains limited. Our aim was to evaluate the association between MN frequency in exfoliated buccal cells and exposure to subway particulate matter among Parisian subway workers. We also investigated whether MN frequency was associated with biomarkers of oxidative stress and metabolism-related effects. We recruited 303 subway workers and collected their buccal cell samples. Concentrations of metals in urine and exhaled breath condensate were quantified using inductively coupled plasma mass spectrometry, and effect biomarkers were analyzed via liquid chromatography-mass spectrometry. Factor analyses were used to characterize metal mixtures and oxidative stress profiles. Associations with MN frequency were assessed using multivariable Poisson regression models adjusted for confounders. Despite that all 269 workers who provided buccal cell samples had low exposures, urinary titanium concentrations were significantly associated with increased MN frequency (RR = 2.013, p = 0.004). Furthermore, oxidative stress constituting mainly of urinary malondialdehyde and 8-hydroxy-2′-deoxyguanosine showed a statistically significant association with increased MN frequency in buccal cells (RR = 1.214, p = 0.045). Women exhibited a significantly lower MN

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frequency in buccal cells compared to men. No statistically significant associations were found with PM10 air concentrations nor employment duration. Urinary titanium concentrations and oxidative stress biomarkers were significantly associated with MN frequency in buccal cells, suggesting that MN frequency may reflect systemic biological effects even in low-exposure settings.

Authors: Nancy B Hopf, Mélanie Graille, Kakima Kastuganova, Pascal Wild, Jean-Jacques Sauvain, Nicole Charriere, Valérie Jouannique, Amélie Debatisse, Irina Guseva Canu

Full Source: Environment international 2025 Dec 3:207:109978. doi: 10.1016/j.envint.2025.109978.

Changes in lung function and fractional exhaled nitric oxide across wildfire seasons in the wildland firefighter exposure and health effect (WFFEHE) study

2025-12-05

Introduction: Long-term pulmonary effects of wildland firefighting are unclear even though lung function declines have been observed following wildfire season and firefighting shift.

Methods: Spirometry and airway inflammation indicated as fractional exhaled nitric oxide (FeNO) were measured among 152 wildland firefighters (WFFs) at the beginning (pre-season, April & May) and end (post-season, September & October) of the 2018 and/or 2019 wildfire seasons and among 19 WFFs at across 3 days of firefighting during a 2019 mid-season wildfire deployment.

Results: Overall peak expiratory flow (PEF) and percent of predicted PEF (PEF%) significantly decreased across fire season when 2018 and 2019 measurements were combined (-0.15 ± 0.07 L/s, $p = 0.04$; -1.87 ± 0.71%, $p = 0.01$; respectively), more so due to 2018 declines. PEF% and percent of predicted forced vital capacity (FVC%) significantly improved between 2018 post-season and 2019 pre-season (i.e., off-season) (3.08 ± 1.26%, $p = 0.02$; 0.99 ± 0.41%, $p = 0.02$; respectively). FVC and FVC% significantly decreased across a firefighting shift on the first day of wildfire deployment (-0.12 ± 0.03 L, $p < 0.01$; -2.35 ± 0.64%, $p < 0.01$). FeNO significantly decreased across the 2018 and 2019 fire seasons ($p < 0.01$) and significantly increased during the off-season ($p < 0.01$). FeNO also showed statistically significant cross-shift decreases on the second day of wildfire deployment (-3.50 ± 0.95 ppm, $p < 0.01$).

Conclusions: Seasonal wildland firefighting were associated with decreases in lung function and FeNO as well as increases in respiratory symptom score in this cohort. While lung function recovered during

Introduction: Long-term pulmonary effects of wildland firefighting are unclear even though lung function declines have been observed following wildfire season and firefighting shift.

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the off-season among the WFFs, the results suggest a need for longer-term studies to determine the impact of chronic wildland firefighting on pulmonary health.
Authors: Chieh-Ming Wu, Kathleen Clark, Olorunfemi Adetona, Kathleen Navarro DuBose, Corey Butler, Alejandra Ramirez-Cardenas, James Odei, Molly West, Christa Hale
Full Source: International journal of hygiene and environmental health 2025 Dec 5:272:114729. doi: 10.1016/j.ijheh.2025.114729.

The Impact of a Blue-Blocking Filter Over One Eye on Health and Performance Outcomes and Its Implications for Night Workers

2025-12-07
The higher risk for cancer documented among night-shift nurses compared to the day-shift nurses possibly results from lower melatonin levels associated with exposure to light at night in the work environment. Research demonstrates that eliminating spectral power <530 nm to both eyes prevents light-induced nocturnal melatonin suppression, and complete occlusion of one eye reduces melatonin suppression relative to that when both eyes are open. This study investigated whether filtering short wavelengths from one eye using a blue-blocking filter, rather than occluding one eye, would maintain high melatonin levels, alertness, and visual performance. This crossover, within-subjects study ran for six nights. Subjects experienced one of six light conditions involving combinations of binocular versus monocular and filtered versus unfiltered vision per night. Normalized melatonin concentration area under the curve (AUCn) served as the primary outcome and the numerical verification (NVT) and go/no-go (GNG) performance tasks, pupil area, and subjective sleepiness (Karolinska Sleepiness Scale [KSS]) served as secondary outcomes. Both filtered and unfiltered monocular light conditions resulted in significantly greater melatonin AUCn than the unfiltered binocular light condition. Performance at the NVT and at the GNG was not affected by filtering one eye compared to the unfiltered binocular light condition, nor did it affect KSS ratings. Melatonin AUCn positively correlated with pupil area for corresponding light conditions. In conclusion, filtering one eye can help preserve melatonin levels in night workers while maintaining alertness

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and visual performance, which could be a simple and effective solution for improving health in night-shift nurses.
Authors: Mariana G Figueiro, John D Bullough, Muneer Rizvydeen, Barbara Plitnick, Weixin Li, Mark S Rea
Full Source: Biological research for nursing 2025 Dec 7:10998004251406550. doi: 10.1177/10998004251406550.