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CONTACT US

subscribers@chemwatch.net

tel +61 3 9572 4700

fax +61 3 9572 4777

1227 Glen Huntly Rd

Glen Huntly

Victoria 3163 Australia

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CHEMICAL EFFECTS

Evaluation of cardiac toxicity of a neonicotinoid insecticide, dinotefuran, in a zebrafish heart failure animal model

2025-10-15

Dinotefuran, a widely used neonicotinoid insecticide, is environmentally persistent and frequently detected in aquatic systems, raising concerns for non-target organisms. However, its cardiotoxic effects remain unclear. Here, we provide the first comprehensive evidence of its cardiotoxicity in normal and heart failure zebrafish model. Dinotefuran exposure increased the incidence of uninflated swim bladders, reduced survival and locomotor activity in a dose-dependent manner. Cardiac structure was altered, with looping defects more frequent, as the incidence of no-loop formations increased from 13 % to 37 %, and the atrium-ventricle ratio rose from 0.9 to 1.4. Cardiac function was impaired, with contractile performance declining as ejection fraction decreased from 43 % to 29 % and relative cardiac output from 0.3 to 0.1. Rhythm stability was also reduced, with reduced heart rate and increased beat-to-beat variability by 43 %. At the cellular level, dinotefuran markedly promoted apoptosis and upregulated reactive-oxygen species (ROS)-related genes without antioxidant compensation. In parallel, the cardiac stress marker was induced by two-folds, and maladaptive shifts in chamber-specific gene. In conclusion, dinotefuran exerted impaired cardiotoxicity through oxidative stress, highlighting its environmental and human health risks. Future studies should validate these mechanisms in mammalian and human-relevant systems and assess the effects of chronic exposures to better define long-term health and environmental risks.

Authors: Inho Kim, Seung Hyeok Seok, Hae-Young Lee

Full Source: Ecotoxicology and environmental safety 2025 Oct 15:305:119246. doi: 10.1016/j.ecoenv.2025.119246.

Network toxicology focused investigation on the impacts of inorganic arsenic and cadmium on human and ecosystem health

2025-11-08

Environmental chemicals impact health through diverse pathways, underscoring the need for approaches beyond traditional animal-based testing to capture their transport, transformation, and mechanisms for risk assessment. Network toxicology offers an in silico framework to elucidate such exposure pathways and toxicity mechanisms, thereby

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supporting New Approach Methodologies for toxicity assessment. This study utilized network-based approaches to comprehensively characterize the impacts of inorganic arsenic and cadmium contamination in India from a One Health perspective. First, Aggregate Exposure Pathways were constructed by systematically curating India-specific data on the presence of inorganic arsenic and cadmium across environmental and biological states to understand their transport and transformation. Next, inorganic arsenic- and cadmium-induced toxicities were explored by mapping their toxicity endpoints from six exposome-relevant databases to key events across Adverse Outcome Pathways (AOPs) cataloged in AOP-Wiki, revealing 51 and 78 associated AOPs, respectively. Construction of AOP networks further aided in inferring novel taxonomic applicability information. Moreover, the combined AEP-AOP constructs facilitated mechanistic case studies of human and ecological health-relevant pathways, and highlighted critical knowledge gaps in terms of human exposures and bioaccumulation within tissues. Further, stressor-species networks constructed using ECOTOX data identified vulnerable species and those with bioaccumulative potential. Additionally, species sensitivity distributions and toxicity-normalized SSDs provided a comparative framework for prioritizing these compounds, and their integration into stressor-species networks highlighted sensitive species, enhancing their relevance for ecological risk assessment. Finally, the risk quotient analysis for Indian rivers revealed that many regions exhibited elevated ecological risks. Overall, this study underscores the value of network toxicology in supporting a One Health-based framework to inform regulatory decision-making and enhance mitigation strategies for inorganic arsenic and cadmium in India.

Authors: Nikhil Chivukula, Shreyes Rajan Madgaonkar, Kundhanathan Ramesh, Swetha Mangot, Panneerselvam Karthikeyan, Shambanagouda Rudragouda Marigoudar, Krishna Venkatarama Sharma, Areejit Samal
Full Source: Environmental toxicology and chemistry 2025 Nov 8:vgaf277. doi: 10.1093/etojnl/vgaf277.

Lifetime occupational and para-occupational exposure to organic solvents and testicular germ cell tumor risk: a French case-control study-TESTIS

2025-10-14

Background: Despite an incidence increase in recent decades, the etiology of testicular germ cell tumors (TGCT) remains poorly understood. The hypothesis of a two-stage development, combining initial alteration in utero followed by malignant transformation later in life, has been

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suggested. This study examined the association between cumulative lifetime occupational and para-occupational solvent exposure and TGCT risk.

Methods: The French multicenter case-control study TESTIS included 454 cases and 670 controls. Participants provided information on their occupational history; participants' mothers (N = 547) provided information on their own and the father's occupational history. Solvent exposure was assessed by using the Matgéné job-exposure matrices. The influence of the parental and subject's occupational exposures over the lifetime and at different periods (i.e. fetal life/infancy; childhood; adolescence; subject's exposure) on TGCT was examined. Odds ratios (ORs) and 95% confidence intervals (CIs) were estimated by using conditional logistic regression models.

Results: An OR for TGCT of 1.03 (95% CI 0.59-1.79) was found for the lifetime solvent exposure. When each period was examined individually, the results showed an increased TGCT risk in adult males who were occupationally exposed to trichloroethylene (OR = 3.09; 95% CI 1.25-7.65); fuels and petroleum-based solvents (OR = 1.91; 95% CI 1.21-3.02); diesel, kerosene, and fuel oil (OR = 2.26; 95% CI 1.16-4.41); and ketones and esters (OR = 1.66; 95% CI 1.02-2.71), and suggested a positive association with solvent exposure during adolescence (OR = 1.77; 95% CI 0.95-3.31).
Conclusion: Overall, this study did not suggest a substantial role of cumulative lifetime solvent exposure and TGCT risk. The results showed an increased TGCT risk associated with solvent exposure during adulthood. Indirect exposure to certain solvents during adolescence might also promote TGCT development.

Authors: Margot Guth, Marie Lefevre, Astrid Coste, Delphine Praud, Olivia Perol, Corinne Pilorget, Brigitte Dananché, Aurélie Danjou, Jeanne Perrin, Véronique Drouineaud, Louis Bujan, Joachim Schüz, Ann Olsson, Barbara Charbotel, Béatrice Fervers, TESTIS Study Group, Helen Boyle, Aude Fléchon, Elodie Belladame, Rémi Béranger, Céline Chalas, Myriam Virlovet, Lucile Ferreux, Guillemette Perier, Pauline Peretout, Diane Rivet, Sandrine Rulle, Florence Eustache, Nathalie Sermondade, Marine Durand, Rachel Levy, Isabelle Berthaut, Jacqueline Saias-Magnan, Catherine Metzler-Guillemain, Carole Daoud-Deveze, Myriam Daudin, Florence Brugnon, Valérie Bruhat, Cyril Bouche, Isabelle Kocsinski, Marius Teletin, Françoise Schmitt, Nathalie Guyomard, Aline Papaxanthos, Volcy Soula, Sandrine Giscard d'Estaing, Pascale Dehee, Delphine Yalcinkaya, Céline Bouillon, Cynthia Frapsauce, Anne Viallon, Bérengère Ducrocq, Marie-Ange Clarotti, Ethel Szerman, Amélie Ancelle, Oxana Blagosklonovand Séverine Bey, Célia Ravel, Ségolène Veau, Agnès Letremy, Patricia Fauque, Julie Barberet, Stéphanie Lattes, Emmanuelle Thibault, Catherine Diligent, Christel

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Hersant, Vanessa Loup-Cabaniols, Anna Gala, Sylvianne Hennebicq, Julien Bessonnat, Marie-Claude Blocquaux

Full Source: International journal of epidemiology 2025 Oct 14;54(6):dyaf175. doi: 10.1093/ije/dyaf175.

ENVIRONMENTAL RESEARCH

Mechanistic insights into Thallium mobility through microplastics: Environmental fate and risks - a review

2025-10-15

Microplastics (MPs) are increasingly recognized as serious environmental pollutants, posing significant threats to aquatic ecosystems and human health. Thallium (Tl), although less frequently studied, is of particular concern due to its high toxicity, environmental persistence, and strong bioaccumulative potential. Recent studies suggest that MPs may play a role in the transport and mobility of Tl in the environment, raising concerns about their contribution as emerging vectors of trace elements. The adsorption behavior of Tl onto MPs is a multifaceted process influenced by parameters such as pH, salinity, ionic strength, and the physicochemical properties of both MPs and Tl species. However, our understanding of Tl interactions with MPs remains limited. This review explores current knowledge on the occurrence, distribution, and environmental behavior of Tl, with a particular focus on its interactions with MPs. It emphasizes mechanistic insights into adsorption processes, compares Tl behavior with other environmentally relevant elements, and explores the role of MPs in influencing Tl mobility and toxicity. The review also identifies critical knowledge gaps and highlights the need for further research on MPs-trace element interactions to inform strategies that mitigate environmental and health risks. Understanding the interactive effects of Tl toxicity and MPs behavior can ultimately support the development of more effective environmental protection policies.

Authors: Atta Rasool, Kateřina Brožová, Kristina Čabanová, Jan Halfar, Jitka Chromíková, Petra Malíková, Oldřich Motyka, Eva Pertile, Silvie Drabinová, Silvie Heviánková

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PHARMACEUTICAL/TOXICOLOGY

Associations of PFAS exposure with obstetric and birth outcomes in the Japan Environment and Children's Study (JECS): Is maternal endometriosis an effect modifier?

2025-11-06

Per- and polyfluoroalkyl substances (PFAS) are reportedly associated with adverse obstetric outcomes, including premature labor and gestational diabetes. We aimed to evaluate associations of maternal PFAS exposure with obstetric and birth outcomes in the Japan Environment and Children's Study cohort. This study included 23,596 participants with first-trimester plasma samples analyzed for PFAS concentrations by liquid chromatography-tandem mass spectrometry. Outcome data were transcribed from physicians' questionnaires at birth, and covariates from maternal or prenatal questionnaires. Adjusted odds ratios with 95% confidence intervals (CIs) were calculated for exposure to individual PFAS and several outcomes using binary logistic regression; B coefficients with 95% CIs were obtained for gestational weight gain (GWG). The Benjamini-Hochberg method controlled the false discovery rate. A quantile g-computation model assessed associations between PFAS mixtures and outcomes. Significant associations were found between exposure to eight PFAS and 10 outcomes, including placenta previa, cesarean delivery, GWG, post-term birth, and threatened abortion. Although the associations were usually positive, negative associations were observed between certain PFAS congeners and intrauterine growth restriction, non-reassuring fetal status, term premature rupture of membranes, and threatened premature labor. PFAS exposure during pregnancy showed modest positive and negative associations with obstetric and birth outcomes. PFAS mixtures were positively associated with cesarean delivery, neonatal complications, and post-term birth, and negatively with GWG. Associations of PFAS exposure with neonatal complications, threatened premature labor, threatened abortion and cesarean delivery varied between women with and without endometriosis. Despite restrictions on many PFAS, they may still affect obstetric health.

Authors: Joselyn Dionisio, Yuki Ito, Sayaka Kato, Daiki Hiraoka, Yukihiro Ohya, Shin Yamazaki, Tomohiko Isobe, Shinji Saitoh, Mayumi Sugiura-Ogasawara, Michihiro Kamijima, Japan Environment and Children's Study Group

Full Source: Environmental pollution (Barking, Essex: 1987) 2025 Nov 6:127353. doi: 10.1016/j.envpol.2025.127353.

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Association of radon exposure with lung cancer: serum biomarkers and computed tomography evidence from male miners

2025-11-06

The objective of this research is to investigate the association between occupational radon exposure and pulmonary health outcomes in male miners from Chongqing, China. Between June 2022 and December 2023, 110 miners were enrolled in this cross-sectional study. Personal radon exposure levels were measured using passive cumulative dosimeters, with pulmonary health assessed through radiologist-interpreted low-dose computed tomography (CT) scans and serum biomarker analysis (CEA, CYFRA21-1, NSE, and CA125) via ELISA. Multivariable analyses revealed strong dose-response relationships between radon exposure and both serum biomarkers and CT abnormalities. High radon exposure predicted substantial biomarker elevations including a 2.45-fold increase in CYFRA21-1 ($\beta=0.39$, 95% CI 0.25-0.54, $p<0.001$), 1.60-fold increase in CEA ($\beta=0.20$, 0.05-0.35, $p=0.008$), and 3.58-fold increased CT abnormality risk (OR=3.58, $p=0.023$). Mediation analysis identified CYFRA21-1 as accounting for 69% ($p=0.024$) and CEA for 24.7% ($p=0.036$) of radon's effect on CT abnormalities. These findings demonstrate that occupational radon exposure contributes to pulmonary damage through both direct effects and biomarker-mediated pathways, with CYFRA21-1 and CEA emerging as potential early indicators of lung cancer in radon-exposed populations.

Authors: Jinghua Zhou, Qiang Huang, Wei Li, Jun Diao, Liuqing Lai, Li Chen, Bo Fang

Full Source: Environmental pollution (Barking, Essex: 1987) 2025 Nov 6:127348. doi: 10.1016/j.envpol.2025.127348.

Associations of PFAS exposure with obstetric and birth outcomes in the Japan Environment and Children's Study (JECS): Is maternal endometriosis an effect modifier?

2025-11-06

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were transcribed from physicians' questionnaires at birth, and covariates from maternal or prenatal questionnaires. Adjusted odds ratios with 95% confidence intervals (CIs) were calculated for exposure to individual PFAS and several outcomes using binary logistic regression; B coefficients with 95% CIs were obtained for gestational weight gain (GWG). The Benjamini-Hochberg method controlled the false discovery rate. A quantile g-computation model assessed associations between PFAS mixtures and outcomes. Significant associations were found between exposure to eight PFAS and 10 outcomes, including placenta previa, cesarean delivery, GWG, post-term birth, and threatened abortion. Although the associations were usually positive, negative associations were observed between certain PFAS congeners and intrauterine growth restriction, non-reassuring fetal status, term premature rupture of membranes, and threatened premature labor. PFAS exposure during pregnancy showed modest positive and negative associations with obstetric and birth outcomes. PFAS mixtures were positively associated with cesarean delivery, neonatal complications, and post-term birth, and negatively with GWG. Associations of PFAS exposure with neonatal complications, threatened premature labor, threatened abortion and cesarean delivery varied between women with and without endometriosis. Despite restrictions on many PFAS, they may still affect obstetric health.

Authors: Joselyn Dionisio, Yuki Ito, Sayaka Kato, Daiki Hiraoka, Yukihiro Ohya, Shin Yamazaki, Tomohiko Isobe, Shinji Saitoh, Mayumi Sugiura-Ogasawara, Michihiro Kamijima, Japan Environment and Children's Study Group

Full Source: Environmental pollution (Barking, Essex: 1987) 2025 Nov 6:127353. doi: 10.1016/j.envpol.2025.127353.

OCCUPATIONAL

Metal and Metalloid Exposure and Cognitive Function among Copper Mine Workers: A Three-Year Longitudinal Study

2025-11-06

Occupational exposure to heavy metals is increasingly recognized as a threat to neurological health. This three-year longitudinal study investigated the relationship between heavy metal exposure and cognitive performance among 69 copper miners and 74 non-miner controls. Blood concentrations of heavy metals were determined using atomic absorption spectrophotometry, while cognitive performance was assessed with

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standardized neuropsychological tests, including the Mini-Mental State Examination (MMSE), Symbol Digit Modalities Test (SDMT), Paced Auditory Serial Addition Test (PASAT), Psychomotor Vigilance Task (PVT), creativity measures, and the Beck Depression Inventory. The results demonstrated significantly higher blood levels of arsenic and lead in miners compared with controls, whereas copper levels showed no meaningful group difference. Elevated arsenic concentrations were strongly associated with reduced performance on the oral SDMT, reflecting impairments in information processing speed and working memory. Longitudinal analyses confirmed persistent group differences in neurocognitive outcomes, with age and education exerting notable modifying effects. Interestingly, miners consistently exhibited lower depression scores across the study period, despite greater exposure to toxic metals. These findings indicate that chronic occupational exposure to arsenic and lead contributes to subtle but measurable cognitive deficits in copper miners, particularly in domains of working memory and processing speed.

Authors: Narjes Soltani, Tabandeh Sadeghi, Majid Saadloo, Mohammad Reza Baneshi, Soghra Akbari Chermahini, Ali Shamsizade

Full Source: Neurotoxicology 2025 Nov 6:103349. doi: 10.1016/j.neuro.2025.103349.

Impact of Microplastics and Nanoplastics on Human Health: Mechanistic Insights and Exposure Pathways

2025-11-05

Microplastics (MPs) and nanoplastics (NPs) have emerged as critical environmental contaminants with potential adverse effects on human health. This review examines the various ways MPs and NPs can be spread in the environment and their potential impact on humans. They can be introduced into the environment through multiple sources, like synthetic textiles, cosmetics, packaging, and industrial processes. These particles enter the human body through ingestion, inhalation, and skin contact, and they deposit in various tissues, including the lungs, kidneys, and gastrointestinal tract. Additionally, they can cross embryonic layers and reach the placenta. They can cause inflammation, oxidative stress, metabolic disorders, genotoxicity, and immunotoxic effects upon interaction, as confirmed by in-vivo and in-vitro studies. Furthermore, long-term exposure to MPs and NPs causes various complications to the human body, including metabolic disorders or even the development of cancers. Despite the presence of much evidence, a significant gap remains in fully understanding the mechanism of toxicity posed by MPs and NPs exposure and its long-term health outcomes. There is an urgent need for

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extensive investigations and improvement in standardized methods to evaluate the human health impact of MPs and NPs. This review explores current evidence on exposure pathways, bioaccumulation mechanisms, and health outcomes and identifies critical knowledge gaps.

Authors: Mohd Fazal Ur Rehman, Mohammad Muaz Khan, Mohammad Mansoob Khan

Full Source: Toxicology letters 2025 Nov 5:111769. doi: 10.1016/j.toxlet.2025.111769.

The nail salon workforce: a systematic scoping review of carcinogen exposure assessments, health outcome, and workforce intervention research

2025-11-10

Nail salon workers are routinely exposed to occupational hazards, including volatile organic compounds (VOCs), ultraviolet radiation, fine particulate matter (PM_{2.5}), and heavy metals. With the industry projected to double in size over the next decade, identifying exposure risks and intervention gaps is essential for workforce protection. This systematic scoping review synthesized peer-reviewed exposure assessments, health outcome studies, and intervention research in nail salons published between 2013 and 2024. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses and the National Institute of Environmental Health Sciences National Toxicology Program Handbook for Conducting Systematic Reviews. Risk of bias was assessed using the Strengthening the Reporting of Observational Studies in Epidemiology guidelines. Forty-two studies met inclusion criteria: 29 exposure assessments, 11 health outcome studies, and two intervention evaluations. Most were conducted in the U.S. (88 %), with sample sizes ranging from 20 to 150 workers. Common findings included inadequate ventilation (71 %), VOC concentrations above Occupational Safety and Health Administration limits, and persistent detection of methyl methacrylate, despite its U.S. Food and Drug Administration ban. PM_{2.5} was evaluated in one study and exceeded World Health Organization guidelines. Heavy metals were infrequently measured, though one study raised concerns about chronic exposure. Only 17 % of studies examined exposure-health outcome associations, with limited evidence on cognitive and psychosocial impacts. Two intervention studies reported improved knowledge and reduced exposures but lacked randomized designs. This review highlights the urgent need for evidence-based interventions, stronger regulatory

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oversight, and comprehensive evaluation of health impacts in this socially vulnerable workforce.

Authors: Thoin F Begum, Robin Taylor Wilson, Leuna Sarah, Ayan Labrooy, Emma Marie Porcaro, Grace X Ma

Full Source: Reviews on Environmental Health 2025 Nov 10. doi: 10.1515/reveh-2025-0070.