CHEMWATCH

Bulletin Board

Contents

AUG. 01, 2025

(click on page numbers for links)

CONTACT US

subscribers@chemwatch.net
tel +61 3 9572 4700
fax +61 3 9572 4777

1227 Glen Huntly Rd
Glen Huntly
Victoria 3163 Australia

CHEMICAL EFFECTS

EGCG attenuates BPA -induced male reproductive toxicity by regulating the blood-testis barrier by suppressing autophagy via AMPK/AKT/mTOR signaling pathway

2025-07-22

Bisphenol A (BPA) is a typical endocrine disrupting chemical widely distributed in the environment and in food systems. The adverse effects of BPA on reproductive health have posed major concerns worldwide. The aim of this study was to determine the potential of epigallocatechin gallate (EGCG) to protect against BPA-induced male reproductive toxicity and investigate the underlying protective mechanism. The protective effects of EGCG on BPA-induced reproductive toxicity were investigated using male zebrafish model. The results showed that EGCG alleviated BPA-induced developmental toxicity of F1 generation of zebrafish, reversed testis disorder and combated the blood-testis barrier (BTB) damage caused by BPA in zebrafish. In order to unravel the underlying mechanism, TM4 cell - constructed BTB model was used for further study. The results indicated that EGCG counteracted the damage induced by BPA on the integrity of BTB model and reduced the autophagy caused by BPA. Furthermore, EGCG effectively inhibited the BPA-induced upregulation of the expression level of AMPK (p-AMPKα/AMPKα), significantly restored the BPA-mediated downregulation of the expression levels o f p-mTOR/mTOR, p-AKT/AKT and Raptor. The results suggested that EGCG mitigated the BPA-induced male reproductive toxicity through maintaining the integrity of BTB by inhibiting the autophagy mediated by AMPK/AKT/mTOR signaling pathway. This study provided a strategy for combating the BPA-induced reproductive toxicity using a well-known bioactive component as a potential therapeutic approach.

Authors: Qingyan Wang, Yunjie Su, Qian Yang, Trust Beta, Fei Shen, Qin Liu
Full Source: Comparative biochemistry and physiology. Toxicology & pharmacology : CBP 2025 Jul 22:110298. doi: 10.1016/j.cbpc.2025.110298.

Argovit™ Silver Nanoparticles Mitigate Sodium Arsenite-Induced Cytogenotoxicity Effects in Cultured Human Lymphocytes

2025-06-27

Exposure to arsenic, a known environmental and occupational genotoxicant, poses significant health risks. Identifying agents capable of mitigating its effects is crucial for public health. This study evaluates

CHEMWATCH
Bulletin Board
Technical
AUG. 01, 2025

the protective potential of Argovit™ silver nanoparticles (AgNPs) against cytotoxic and genotoxic damage induced by sodium arsenite in ex vivo cultured human lymphocytes obtained from the whole blood of healthy donors. Lymphocytes were exposed to sodium arsenite (3.7 × 10-3 µg/mL) and Argovit™ AgNPs (3.6 × 10-3 µg/mL). The cytokinesis-block micronucleus (CBMN) assay was performed using a modified 144 h protocol to assess delayed effects across two cell cycles. Four groups were analyzed: untreated control, sodium arsenite only, AgNPs only, and sodium arsenite followed by AgNPs. Arsenite exposure increased cytotoxic and genotoxic biomarkers. In contrast, post-treatment with AgNPs significantly reduced these effects. All treatments were performed in duplicate, and data were analyzed using the Kruskal-Wallis test with Dunn's post hoc comparison ($p < 0.05$). Statistical analysis confirmed the antigenotoxic and cytoprotective properties of Argovit™. These findings support its potential application as a mitigating agent in scenarios of environmental or occupational exposure to genotoxic compounds.

Authors: María Del Carmen Jauregui Romo, Balam Ruiz Ruiz, Francisco Casilas-Figueroa, Nayeli Guadalupe Girón Vázquez, Roberto Luna Vázquez Gómez, Olivia Torres-Bugarín, Idalia Yazmín Castañeda Yslas, Alexey Pestryakov, Nina Bogdanchikova, María Evarista Arellano García
Full Source: Toxics 2025 Jun 27;13(7):539. doi: 10.3390/toxics13070539.

Biomonitoring of Inorganic Pollutants in Blood Samples of Population Affected by the Tajogaite Eruption: The ISVOLCAN Study in Spain

2025-07-10

Volcanic eruptions release gases and particulates that may adversely affect human health. The Tajogaite eruption on La Palma provided a unique opportunity to evaluate inorganic pollutant exposure in a directly affected population. As part of the ISVOLCAN study, blood samples from 393 adults residing in the island's western region were analyzed for 43 inorganic elements using Inductively Coupled Plasma Mass Spectrometry (ICP-MS), including 20 toxic elements identified by the Agency for Toxic Substances and Disease Registry (ATSDR). The median age of participants was 51 years, and 56.7% were female. Higher levels of Hg and Mn were associated with long-term occupational exposure, while smoking was linked to elevated Cd, Pb, and Sr levels. Participants living within 6.5 km of the volcano had significantly higher concentrations of Al and Ti. Ash cleanup activities were associated with increased levels of Ni and Cu, and those spending over five hours outdoors daily showed elevated Se and Pb. This is the first biomonitoring study to assess blood concentrations

of inorganic pollutants in a population exposed to volcanic emissions. The findings highlight key exposure factors and underscore the need for continued research to assess long-term health effects and inform public health measures.
Authors: Katherine Simbaña-Rivera, María Cristo Rodríguez-Pérez, Manuel Enrique Fuentes-Ferrer, Manuel Zumbado Peña, Ángel Rodríguez Hernández, Julia Eychenne, Lucie Sauzéat, Damary S Jaramillo-Aguilar, Ana Rodríguez Chamorro, Luis D Boada
Full Source: Toxics 2025 Jul 10;13(7):581. doi: 10.3390/toxics13070581.

ENVIRONMENTAL RESEARCH

Micro- and Nanoplastics in the Environment: Current State of Research, Sources of Origin, Health Risks, and Regulations-A Comprehensive Review

2025-07-02
Small-particle-produced goods, such as those used in industry, medicine, cosmetics, paints, abrasives, and plastic pellets or powders, are the main sources of microplastics. It is also possible to mention tire recycling granules here. Larger components break down in the environment to generate secondary microplastics. Microplastics, or particles smaller than 5 mm, and nanoplastics, or particles smaller than 1 µm, are the products of degradation and, in particular, disintegration processes that occur in nature as a result of several physical, chemical, and biological variables. Polypropylene, polyethylene, polyvinyl chloride (PVC), polystyrene, polyurethane, and polyethylene terephthalate (PET) are among the chemicals included in this contamination in decreasing order of quantity. Micro- and nanoplastics have been detected in the air, water, and soil, confirming their ubiquitous presence in natural environments. Their widespread distribution poses significant threats to human health, including oxidative stress, inflammation, cellular damage, and potential carcinogenic effects. The aim of this article is to review the current literature on the occurrence of micro- and nanoplastics in various environmental compartments and to analyze the associated health consequences. The article also discusses existing legal regulations and highlights the urgent need for intensified research into the toxicological

CHEMWATCH
Bulletin Board
Technical
AUG. 01, 2025

mechanisms of microplastics and the development of more effective strategies for their mitigation.
Authors: Anna Kochanek, Katarzyna Grąz, Halina Potok, Anna Gronba-Chyła, Justyna Kwaśny, Iwona Wiewiórska, Józef Ciuła, Emilia Basta, Jacek Łapiński
Full Source: Toxics 2025 Jul 2;13(7):564. doi: 10.3390/toxics13070564.

A Golgi-targeting fluorescent probe for the detection of hydrazine in biological and environmental systems

2025-07-25
Hydrazine (N2H4) is regarded as an extremely toxic agent but it is used in large quantities as a chemical raw material in various industries, which poses a severe danger to both the environment and public health. Notably, the Golgi apparatus (GA) of hepatocytes is frequently affected by toxins in cases of hepatotoxicity. Therefore, developing a probe to monitor N2H4 in environmental systems and within the GA of live cells is highly valuable. A Golgi-targeting fluorescent probe, BHMBS, is synthesized to detect N2H4. The probe BHMBS emits faint green fluorescence at 550 nm, which is remarkably enhanced after adding N2H4. The probe can detect N2H4 with an ultra-short reaction time, high sensitivity, and excellent selectivity, making it a valuable tool to monitor N2H4 in the real world and image the N2H4 fluctuations in cells and zebrafish.
Authors: Hui-Juan Lai, Xu Wang, Yuan Wang, Wei-Na Wu, Zhi-Hong Xu
Full Source: Analytical methods: advancing methods and applications 2025 Jul 25. doi: 10.1039/d5ay00690b.

Concentrations, Compositions and Human Exposure Risks to Organophosphate Esters in Indoor Air from Various Microenvironments in Guangzhou, China

2025-06-25
Limited research has characterized the occurrence of organophosphate esters (OPEs) in indoor microenvironment air. To address this gap, ten OPE congeners were measured in air samples collected from 46 homes, 12 offices, 6 student dormitories, and 60 private cars in Guangzhou, China. Among the four microenvironments, private vehicles exhibited the highest total OPE concentrations (ΣOPEs), with an average of 264.89 ng/m3-statistically significantly higher than the other three environments ($p < 0.05$). This finding underscores the need for increased attention to OPE environmental fate in vehicles and associated human exposure risks. Distinct compositional profiles of OPEs were observed across

microenvironments. In homes, offices, and student dormitories, tris(2-chloroethyl) phosphate (TCEP) and tris(2-chloropropyl) phosphate (TCPP) dominated the OPE mixture, accounting for 56% and 34% of ΣOPEs, respectively. By contrast, private cars were characterized by elevated levels of TCPP (68% of ΣOPEs) and tris(1,3-dichloro-2-propyl) phosphate (TDCP, 12%), reflecting source-specific emission patterns related to automotive materials. Significant correlations existed in most of the OPEs in the private cars, indicating that there are many potential sources of OPEs in private cars, and one source may release multiple OPEs. Human inhalation exposure to OPEs was estimated based on measured air concentrations. Daily respiratory exposure doses ranged from 9.1 to 30.85 ng/kg/d across different populations, with all values falling below established thresholds for non-carcinogenic and carcinogenic risks. These results indicate that current indoor air OPE levels in the studied microenvironments do not pose significant health hazards via inhalation pathways under typical exposure scenarios.

Authors: Yunmei Cai, Maoyuan Xu, Minghui Ouyang, Yusheng Wu, Ruijie Wang, Kewen Zheng, Guofa Ren
Full Source: Toxics 2025 Jun 25;13(7):531. doi: 10.3390/toxics13070531.

PHARMACEUTICAL/TOXICOLOGY

The Health Impact of Using Anti-PD-1 Agents to Treat Early-Stage Cancer in Belgium

2025-07-24
Introduction: Anti-PD-1 agents, inhibitors of programmed cell death protein 1 (PD-1), significantly improve clinical outcomes and overall survival for individuals with several metastatic and early-stage cancers. This study evaluates the health impact of using anti-PD-1 agents for early-stage disease (ESD) treatment of melanoma (stage IIB-C and III), renal cell carcinoma (RCC), and triple-negative breast cancer (TNBC) in Belgium (2023-2032).
Methods: Belgian individuals eligible for ESD treatment (target population) entered a Markov-based health outcomes model in a recurrence/event/disease-free state. The model compared anti-PD-1 agents only for metastatic disease treatment (reference scenario) versus anti-PD-1 agents for ESD treatment (ESD scenario) from 2023 to 2032. Clinical outcomes of the model included recurrence/event/disease-free life-years (LYs), total LYs, quality-adjusted LYs (QALYs), recurrences/events, active treatments for metastatic disease, and total deaths. The cumulative health impact of ESD

CHEMWATCH
Bulletin Board
Technical
AUG. 01, 2025

anti-PD-1 treatment in Belgium was calculated as the difference in health outcomes between the ESD and reference scenarios for the time horizon.
Results: Of the 14,306 eligible individuals, 11,065 were predicted to initiate treatment with anti-PD-1 agents for ESD. Anti-PD-1 therapies for ESD increased recurrence/event/disease-free LYs (+13.4%), total LYs (+4.4%), and QALYs (+4.9%) after 10 years. Additionally, ESD treatment decreased recurrences/events (-24.6%), active treatments for metastatic disease (-28.6%), and total deaths (-23.8% decrease) over 10 years.
Conclusions: The investment in and use of innovative anti-PD-1 agents for the treatment of early-stage cancers would have a positive health impact for Belgium and align with the high standards in cancer care called for in Europe's Beating Cancer Plan.

Authors: André Bento-Abreu, Saar Vandekeere, Demet Sönmez, Catarina Neves, Tyler Mantaian, Olivier Ethgen, Raquel Aguiar-Ibáñez
Full Source: Oncology and therapy 2025 Jul 24. doi: 10.1007/s40487-025-00357-z.

OCCUPATIONAL

Integrative Modeling of Urinary Metabolomics and Metal Exposure Reveals Systemic Impacts of Electronic Waste in Exposed Populations

2025-07-05
Background: Informal electronic waste (e-waste) recycling practices release a complex mixture of pollutants, particularly heavy metals, into the environment. Chronic exposure to these contaminants has been linked to a range of health risks, but the molecular underpinnings remain poorly understood. In this study, we investigated the alterations in metabolic profiles due to e-waste exposure and linked these metabolites to systemic biological effects. Methods: We applied untargeted high-resolution metabolomics using dual-column LC-MS/MS and a multi-step analysis workflow combining MS1 feature detection, MS2 annotation, and chemical ontology classification, to characterize urinary metabolic alterations in 91 e-waste workers and 51 community controls associated with the Agbogbloshie site (Accra, Ghana). The impacts of heavy metal exposure in e-waste workers were assessed by establishing linear regression and four-parameter logistic (4PL) models between heavy metal levels and metabolite concentrations. Results: Significant metal-associated metabolomic changes were identified. Both linear and nonlinear models revealed distinct sets of exposure-responsive compounds, highlighting

diverse biological responses. Ontology-informed annotation revealed systemic effects on lipid metabolism, oxidative stress pathways, and xenobiotic biotransformation. This study demonstrates how integrating chemical ontology and nonlinear modeling facilitates exposome interpretation in complex environments and provides a scalable template for environmental biomarker discovery. Conclusions: Integrating dose-response modeling and chemical ontology analysis enables robust interpretation of exposomics datasets when direct compound identification is limited. Our findings indicate that e-waste exposure induces systemic metabolic alterations that can underlie health risks and diseases.

Authors: Fiona Hui, Zhiqiang Pang, Charles Viau, Gerd U Balcke, Julius N Fobil, Niladri Basu, Jianguo Xia

Full Source: Metabolites 2025 Jul 5;15(7):456. doi: 10.3390/metabo15070456.

Effects of lithium nickel manganese cobalt oxide exposure on biological age acceleration: Insights from metabolomics

2025-07-23

The Lithium nickel manganese cobalt oxide (NCM) is a representative new energy material widely used in industry and daily life, but the systemic health influence of exposure to NCM remained largely unknown. This study aimed to reveal the impacts of NCM exposure on biological age acceleration (BAA) and metabolic alteration, as well as the mediating roles of metabolites. NCM exposure was assessed through three methods: external exposure, biomarker of exposure to NCM mixture (Li, Ni, Co, and Mn), with a particular focus on Li exposure. BAA was calculated using the Klemera and Doubal methods, and untargeted metabolomics was conducted among a representative sample of participants (n = 100). High NCM external exposure showed higher BAA than those with low exposure (median BAA: 0.11 vs. -0.32 years), and increased dose-response relationships between NCM exposure biomarker and BAA were observed using two multi-exposure models. Li was the critical component to NCM exposure effects (weight = 0.793). The "meet-in-the-middle" approach identified twenty-eight metabolites associated with both external and biomarkers of exposure to NCM, Li exposure, and BAA (VIP ≥ 1 and FDR ≤ 0.05). Five key metabolites including TG(50:0)-TG(18:0/16:0/16:0), eicosadienoic acid, Gly-Glu, 2-Oxoarginine, and TG(55:1)-TG(16:0/18:1/21:0) mediated 18.10 %-89.40 % of NCM exposure-BAA association. Our findings provide epidemiological evidence on the hazardous NCM exposure and

CHEMWATCH
Bulletin Board
Technical
AUG. 01, 2025

shed light on metabolic biomarkers for the identification and intervention of accelerated aging among populations.

Authors: Wanlu Liu, Yaotang Deng, Guoliang Li, Le Yang, Youyi Wu, Yue Hu, Jieyi Yang, Simin Xian, Mushi Yi, Qiaoyuan Yang, Yansen Bai, Lili Liu

Full Source: Ecotoxicology and environmental safety 2025 Jul 23:302:118733. doi: 10.1016/j.ecoenv.2025.118733.

Occupational exposure to printer toner-emitted nanoparticles at printing facilities influences air and airway microbiomes

2025-07-22

Workplace exposure to printer toner-emitted nanoparticles at commercial printing facilities poses respiratory health risks to workers on the printing floor, however, its impact on environmental and airway microbiomes and how this relates to worker health remains unknown. To investigate this, we prospectively evaluated five printing centres in Singapore, collecting air samples from office areas and printing floors and airway specimens from workers stationed in office or printing floor areas. All specimens were subjected to targeted amplicon sequencing to determine bacteriome and mycobiome profiles. Relationships between nanoparticle exposure levels, air and airway microbiomes were assessed. We reveal that nanoparticle exposure at printing facilities was significantly associated with shifts in air microbiome profiles in high-exposure printing areas relative to low-exposure office areas. Microbiome correlates of indoor air chemical exposures, mainly polycyclic aromatic hydrocarbons (PAHs) and trace elements, were identified. Lung function and airway microbiomes were influenced by nanoparticle exposure where printing floor workers demonstrate reduced lung function, independent of exposure level, with airway microbiomes characterized by enrichment of Chryseobacterium, Porphyromonas and Candida. Assessment of potential air-airway microbial crossover at each site, accounting for nanoparticle exposure levels, reveals significant increases in bacterial but not fungal crossover in printing floor workers. Taken together, this study demonstrates altered environmental and airway microbiomes at commercial printing facilities and in printing floor workers. Further research is needed to assess the long-term health

impacts of such exposure including the potential for microbial profiling in printing facility design and operation.

Authors: Fransiskus Xaverius Ivan, Micheál Mac Aogáin, Nur A'tikah Binte Mohamed Ali, Pei Yee Tiew, Tuang Yeow Poh, Magdiel Inggrid Setyawati, Dhimiter Bello, Philip Demokritou, Kee Woei Ng, Sanjay H Chotirmall

Full Source: NanoImpact 2025 Jul 22:100575. doi: 10.1016/j.impact.2025.100575.