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CHEMICAL EFFECTS

Effects of Flavonoid Supplementation on Nanomaterial-Induced Toxicity: A Meta-Analysis of Preclinical Animal Studies

2022-06-14

Background: Nanomaterials, widely applied in various fields, are reported to have toxic effects on human beings; thus, preventive or therapeutic measures are urgently needed. Given the anti-inflammatory and antioxidant activities, supplementation with flavonoids that are abundant in the human diet has been suggested as a potential strategy to protect against nanomaterial-induced toxicities. However, the beneficial effects of flavonoids remain inconclusive. In the present study, we performed a meta-analysis to comprehensively explore the roles and mechanisms of flavonoids for animals intoxicated with nanomaterials.

Methods: A systematic literature search in PubMed, EMBASE, and Cochrane Library databases was performed up to April 2022. STATA 15.0 software was used for meta-analyses. **Results:** A total of 26 studies were identified. The results showed that flavonoid supplementation could significantly increase the levels of antioxidative enzymes (superoxide dismutase, catalase, glutathione, glutathione peroxidase, and glutathione-S-transferase), reduce the production of oxidative agents (malonaldehyde) and pro-inflammatory mediators (tumor necrosis factor- α , interleukin-6, IL-1 β , C-reactive protein, immunoglobulin G, nitric oxide, vascular endothelial growth factor, and myeloperoxidase), and alleviate cell apoptosis (manifested by decreases in the mRNA expression levels of pro-apoptotic factors, such as caspase-3, Fas cell surface death receptor, and Bax, and increases in the mRNA expression levels of Bcl2), DNA damage (reductions in tail length and tail DNA%), and nanomaterial-induced injuries of the liver (reduced alanine aminotransferase and aspartate aminotransferase activities), kidney (reduced urea, blood urea nitrogen, creatinine, and uric acid concentration), testis (increased testosterone, sperm motility, 17 β -hydroxysteroid dehydrogenase type, and reduced sperm abnormalities), and brain (enhanced acetylcholinesterase activities). Most of the results were not changed by subgroup analyses. **Conclusion:** Our findings suggest that appropriate supplementation of flavonoids

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may be effective to prevent the occupational detriments resulting from nanomaterial exposure.

Authors: Dongli Xie, Jianchen Hu, Tong Wu, Wei Xu, Qingyang Meng, Kangli Cao, Xiaogang Luo

Full Source: *Frontiers in nutrition* 2022 Jun 14;9:929343. doi: 10.3389/fnut.2022.929343.

Implications of endocrine-disrupting chemicals on polycystic ovarian syndrome: A comprehensive review

2022-07-01

Polycystic ovarian syndrome (PCOS) is a complex multifactorial disorder of unknown pathogenesis in which genetic and environmental factors contribute synergistically to its phenotypic expressions. Endocrine-disrupting chemicals (EDCs), a group of widespread pollutants freely available in the environment and consumer products, can interfere with normal endocrine signals. Extensive evidence has shown that EDCs, environmental contributors to PCOS, can frequently induce ovarian and metabolic abnormalities at low doses. The current research on environmental EDCs suggests that there may be link between EDC exposure and PCOS, which calls for more human bio-monitoring of EDCs using highly sophisticated analytical techniques for the identification and quantification and to discover the underlying pathophysiology of the disease. This review briefly elaborated on the general etiology of PCOS and listed various epidemiological and experimental data from human and animal studies correlating EDCs and PCOS. This review also provides insights into various analytical tools and sample preparation techniques for biomonitoring studies for PCOS risk assessment. Furthermore, we highlight the role of metabolomics in disease-specific biomarker discovery and its use in clinical practice. It also suggests the way forward to integrate biomonitoring studies and metabolomics to underpin the role of EDCs in PCOS pathophysiology.

Authors: Aishwarya Jala, Bincy Varghese, Gurparmeet Kaur, Karthikraj Rajendiran, Ratul Dutta, Ramu Adela, Roshan M Borkar

Full Source: *Environmental science and pollution research international* 2022 Jul 1. doi: 10.1007/s11356-022-21612-0.

Polycystic ovarian syndrome (PCOS) is a complex multifactorial disorder of unknown pathogenesis in which genetic and environmental factors contribute synergistically to its phenotypic expressions.

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Case Report: Early Recognition, Treatment, and Occupational Safety Protection are Crucial for Methanol Toxicity

2022-06-14

Background: Despite significant progress in treating methanol poisoning, the lack of training, hazard communication, and occupational safety protection education contributes to the risk of occupational exposure and methanol toxicity. In addition, early diagnosis and timely medical care are essential to reduce the risk of morbidity and mortality, yet it remains a challenging procedure.

Case report: A 35-year-old man working in a fireworks factory came to our emergency department with acute mental change and progressive disturbance of consciousness. The patient's vital signs were stable, and he presented with enlargement of both pupils with a weak reaction to light. Head computed tomography showed low signal intensities in the bilateral basal ganglia. He was admitted to the neurologic intensive care unit, where additional laboratory workup showed high anion-gap metabolic acidosis. Methanol poisoning was thus considered. Before being treated with sodium bicarbonate infusion, hemodialysis, folate, and high-dose vitamin B, the blood and urine samples were collected for toxicity tests, which turned out to be methanol poisoning. After 8 hours of hemodialysis, the patient's consciousness recovered, but he complained of a complete loss of vision in both eyes. Brain and optic nerve magnetic resonance images showed bilateral symmetric putamen lesions and optic neuropathy. Ophthalmic tests indicated visual pathway impairment and optic disc swelling but no fluorescein leakage. The right eye's vision was partially restored on the third day, but he could only count fingers at 20 cm. Unfortunately, his eyesight ceased to improve during the 6 months of follow-up.

Conclusions: Early diagnosis and prompt treatment will improve the prognosis of methanol poisoning in terms of vision and patient survival. Awareness and supervision of commercial alcohol use are indispensable for similar industrial processes.

Authors: Xiaomei Wu, Meifeng Gu, Wei Wang, Hainan Zhang, Zhenchu Tang

Full Source: *Frontiers in medicine* 2022 Jun 14;9:918812. doi: 10.3389/fmed.2022.918812.

Background: Despite significant progress in treating methanol poisoning, the lack of training, hazard communication, and occupational safety protection education contributes to the risk of occupational exposure and methanol toxicity.

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ENVIRONMENTAL RESEARCH

Chemical fingerprinting of organic micropollutants in different industrial treated wastewater effluents and their effluent-receiving river

2022-09-10

Industry wastewater is considered one of the worst polluters of our precious water ecologies. However, the types of pollutants present in wastewater from industrial wastewater treatment plants (IWTs) are still unclear. In this study, a simple and effective chemical fingerprinting method for checking the source-sink relationships among different industrial wastewaters and their effluent-receiving river was established. 107, 228, 155, and 337 chemicals were screened out in wastewater from electronics, steel, textile, and printing and dyeing plants, respectively. Chemical fingerprinting of the detected chemicals was performed, and results showed that aromatic compounds were the most prevalent among the pollutant categories (i.e., 56, 189, and 168 in electronics, iron and steel, and printing and dyeing plants, respectively). The traceability analysis of the chemicals selected in the effluent determined the characteristic pollutants of different industrial enterprises. Sixty-eight compounds were identified as the characteristic pollutants in the different process stages of wastewater of the four IWTs. Of the 84 effluent-receiving river water signature pollutants, 47.6% (n = 40) were also detected in the effluent from the four IWTs. Effective screening of organic pollutants in industrial wastewater and determining their sources will help accelerate the improvement of industrial wastewater treatment technology.

Authors: Mingyuan Liu, Jiawei Lv, Chenghua Qin, Heng Zhang, Linlin Wu, Wei Guo, Changsheng Guo, Jian Xu

Full Source: *The Science of the total environment* 2022 Sep 10;838(Pt 4):156399. doi: 10.1016/j.scitotenv.2022.156399.

Spatiotemporal variations of retinoic acids and their metabolites in the marine environment of Hong Kong

2022-06-29

Excessive intake of retinoic acids (RAs) and the oxidative metabolites, 4-oxo-RAs, can lead to abnormal morphological development in animals. This study investigated spatiotemporal variations of concentrations and compositions of these compounds in Hong Kong's seawater and during algal blooms. Total concentrations of the studied compounds in seawater were up to 0.790 and 0.427 ng/L in dry and wet seasons, respectively,

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though no significant seasonal variation was observed. Spatially, the Deep Bay Water Control Zone was the most enriched area with the studied compounds owing to its semi-enclosed nature and influence from the Pearl River discharge. During algal blooms, the studied compounds were detected up to 4.74 ng/L. Based on calculated risk quotients, the ecological risk of the studied compounds to Hong Kong's marine ecosystems was low. Nevertheless, the occurrence and distribution of these chemicals in the marine environment should be closely monitored where algal blooms frequently occur.

Authors: Katie Wan Yee Yeung, Kevin King Yan Ho, Guang-Jie Zhou, Yuefei Ruan, Paul Kwan Sing Lam, Kenneth Mei Yee Leung
Full Source: Marine pollution bulletin 2022 Jun 29;181:113878. doi: 10.1016/j.marpolbul.2022.113878.

PHARMACEUTICAL/TOXICOLOGY

Tobacco smoke exposure and mitochondrial DNA copy number on neurobehavioural performance: A community study

2022-07-01

The influence of tobacco smoke has been a controversial and very questionable subject within the field of neurological behaviours. To examine the dose-response relationships between tobacco smoke and neurological performance, we investigated whether mitochondrial DNA copy number (mtDNAcn) mediates these relationships. We used restricted cubic spline models to estimate the dose-response relationships. A mediation model was also used to detect the mediating effect. Increased cotinine was negatively associated with auditory memory scores and a 0.51 decrease in mtDNAcn. MtDNAcn acts as a mediator between cotinine and auditory memory. Tobacco smoke levels were inversely associated with mtDNAcn and neurobehavioural changes, and there was a mediation effect between cotinine levels and auditory memory by mtDNAcn.

Authors: Huimin Wang, Mengmeng Fu, Yifei Ma, Chenjuan Liu, Min Wu, Jisheng Nie

Full Source: Environmental science and pollution research international 2022 Jul 1. doi: 10.1007/s11356-022-20921-8.

The influence of tobacco smoke has been a controversial and very questionable subject within the field of neurological behaviours.

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Hydrochlorothiazide use, sun exposure, and risk of keratinocyte cancer

2022-07-02

Background: Keratinocyte cancer (KC) rates are increasing in the U.S., particularly in older age groups. Use of hydrochlorothiazide (HCTZ), due to its photosensitizing properties, and high sun exposure are two known NMSC risk factors, but their synergistic effects are undetermined. The purpose of this study was to examine the development of NMSC between adults who did and did not use HCTZ, as well as those with high and low sun exposure. Methods: A retrospective case-control sample was assembled from adult patients in north-central Wisconsin (USA). Duration of HCTZ use and occupational sun exposure were extracted from electronic health records, along with a linked survey of lifetime sun exposure. Results: There were 333 cases and 666 controls in the analytical sample. A significant main effect was observed for HCTZ duration in the full sample. Under low sun exposure, the odds of NMSC was 14% greater for each additional year of HCTZ use (aOR = 1.14 [1.11, 1.18], $p < 0.001$). In a sensitivity analysis of participants age 70 years and over, there was a borderline significant ($p = 0.086$) HCTZ use by high sun exposure interaction, suggesting modestly increased HCTZ risk in older, high sun exposure adults. Conclusions: Consistent with prior studies, longer duration of HCTZ use was a predictor of NMSC in north-central Wisconsin adults. NMSC may be accelerated in HCTZ users with outdoor lifestyles, but future studies should attempt to further disaggregate specific effects of sun exposure time, HCTZ duration, and age on NMSC development.

Authors: Jeffrey J VanWormer, Eseoghene B Abokede, Richard L Berg

Full Source: BMC public health 2022 Jul 2;22(1):1282. doi: 10.1186/s12889-022-13705-9.

Background: Keratinocyte cancer (KC) rates are increasing in the U.S., particularly in older age groups.

Breast cancer incidence in a national cohort of female workers exposed to special health hazards in Taiwan: a retrospective case-cohort study of ~ 300,000 occupational records spanning 20 years

2022-06-30

Objective: Breast cancer is the most common cancer among women worldwide. In Taiwan, workers exposed to any of 31 hazardous chemicals or carcinogens in the work environment are designated as especially exposed workers (EEWs) by Taiwan's Ministry of Labor. We assessed the risk of breast cancer in this nationwide female EEW cohort.

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Methods: We conducted a nationwide retrospective study of 4,774,295 workers combining data collected from Taiwan's Ministry of Labor's EEW database between 1997 and 2018 and Taiwan's Cancer Registry between 1997 and 2016. Standardized incidence ratios (SIRs) for women exposed to different hazards and breast cancer incidence rate ratios (IRRs) were calculated by Poisson regression, adjusting for age and duration of exposure.

Results: 3248 female workers with breast cancer and 331,967 without breast cancer were included. The SIRs and adjusted IRRs were 1.27 (95% CI 1.18-1.35) and 1.31 (95% CI 1.21-1.42) for lead, 1.74 (95% CI 1.23-2.24) and 1.52 (95% CI 1.13-2.04) for 1,1,2,2-tetrachloroethane, 1.47 (95% CI 1.12-1.82) and 1.42 (95% CI 1.12-1.81) for trichloroethylene/tetrachloroethylene, 1.40 (95% CI 1.23-1.57) and 1.38 (95% CI 1.22-1.57) for benzene, and 2.07 (95% CI 1.06-3.09) and 1.80 (95% CI 1.10-2.94) for asbestos. The results remained similar when factoring in a 2- or 5-year latency period.

Conclusion: This study found possible correlations between occupational exposure to lead, chlorinated solvents (such as 1,1,2,2-tetrachloroethane, trichloroethylene, and tetrachloroethylene), benzene, and asbestos with breast cancer risk among female EEW, suggesting a need for regular screening for breast cancer for employees exposed to these special workplace hazards.

Authors: Yun-Shiuan Chuang, Chun-Ying Lee, Pei-Chen Lin, Chih-Hong Pan, Hui-Min Hsieh, Chia-Fang Wu, Ming-Tsang Wu

Full Source: International archives of occupational and environmental health 2022 Jun 30. doi: 10.1007/s00420-022-01897-x.

OCCUPATIONAL

Case Report: Exposure to Respirable Crystalline Silica and Respiratory Health Among Australian Mine Workers

2022-06-14

Occupational exposure to respirable crystalline silica (RCS) is common in a range of industries, including mining, and has been associated with adverse health effects such as silicosis, lung cancer, and non-malignant respiratory diseases. This study used a large population database of 6,563 mine workers from Western Australia who were examined for personal exposure to RCS between 2001 and 2012. A standardized respiratory questionnaire was also administered to collect information related to their respiratory health. Logistic regression analyses were performed to ascertain the association between RCS concentrations and the prevalence of respiratory symptoms among mine workers. The estimated exposure levels of RCS (geometric mean 0.008mg/m³, GSD 4.151) declined over

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the study period ($p < 0.001$) and were below the exposure standard of 0.05 mg/m³. Miners exposed to RCS had a significantly higher prevalence of phlegm ($p = 0.017$) and any respiratory symptom ($p = 0.013$), even at concentrations within the exposure limit. Miners are susceptible to adverse respiratory health effects at low levels of RCS exposure. More stringent prevention strategies are therefore recommended to protect mine workers from RCS exposures.

Authors: Krassi Rumchev, Dong Van Hoang, Andy Lee

Full Source: Frontiers in public health 2022 Jun 14;10:798472. doi: 10.3389/fpubh.2022.798472.

Occupational Hazards of Dermatology: A Comprehensive Review

2022-06-30

Dermatology involves various occupational hazards that threaten the safety of practicing dermatologists and may often go unrecognized and ignored. These dangers may appear minor but with the daily volume of patients examined by dermatologists do pose significant health risks. A review of the occupational hazards and exposures frequently encountered in the field of dermatology would be beneficial for both dermatologists and patients. In this review, we conducted a comprehensive search of published studies from inception to May 30, 2021 using the terms "dermatology," "occupational exposure," and "biohazard" in PubMed-MEDLINE, Google Scholar, Embase, and Cochrane Central to summarize occupational hazards in dermatology. (SKINmed. 2022;20:177-184).

Authors: Christina D Enescu, Joshua Brady, Reem Kashlan, Mehdi Farshchian, Meena Moossavi

Full Source: Skinmed 2022 Jun 30;20(3):177-184.

Dermatology involves various occupational hazards that threaten the safety of practicing dermatologists and may often go unrecognized and ignored.