

Bulletin Board

Contents

APR. 29, 2022

(click on page numbers for links)

CHEMICAL EFFECTS

Apoptotic p53 Gene Expression in the Regulation of Persistent Organic Pollutant (POP)-Induced Oxidative Stress in the Intertidal Crab <i>Macrophthalmus japonicus</i>	3
Environmental Co-Exposure to Potassium Perchlorate and Cd Caused Toxicity and Thyroid Endocrine Disruption in Zebrafish Embryos and Larvae (<i>Danio rerio</i>).....	4
Comprehensive interpretation of in vitro micronucleus test results for 292 chemicals: from hazard identification to risk assessment application.....	4

ENVIRONMENTAL RESEARCH

Assessment of Physicochemical, Microbiological and Toxicological Hazards at an Illegal Landfill in Central Poland	5
Toward Assessing Absolute Environmental Sustainability of Chemical Pollution.....	6

PHARMACEUTICAL/TOXICOLOGY

Residence in an Area with Environmental Exposure to Heavy Metals and Neurobehavioral Performance in Children 9-11 Years Old: An Explorative Study	7
---	---

OCCUPATIONAL

The Exposure of Workers at a Busy Road Node to PM 2.5: Occupational Risk Characterisation and Mitigation Measures	8
Cognitive Functioning and Nail Salon Occupational Exposure among Vietnamese Immigrant Women in Northern California	9
Radon exposure and risk of cerebrovascular disease: a systematic review and meta-analysis in occupational and general population studies	9
Welder's Anthrax: A Review of an Occupational Disease.....	10

CONTACT US

subscribers@chemwatch.net

tel +61 3 9572 4700

fax +61 3 9572 4777

1227 Glen Huntly Rd

Glen Huntly

Victoria 3163 Australia

Bulletin Board

Technical

APR. 29, 2022

CHEMICAL EFFECTS

Apoptotic p53 Gene Expression in the Regulation of Persistent Organic Pollutant (POP)-Induced Oxidative Stress in the Intertidal Crab *Macrophthalmus japonicus*

2022-04-13

Persistent organic pollutants (POPs), some of the most dangerous chemicals released into the aquatic environment, are distributed worldwide due to their environmental persistence and bioaccumulation. In the study, we investigated p53-related apoptotic responses to POPs such as hexabromocyclododecanes (HBCDs) or 2,2',4,4'-tetrabromodiphenyl ether (BDE-47) in the mud crab *Macrophthalmus japonicus*. To do so, we characterized *M. japonicus* p53 and evaluated basal levels of p53 expression in different tissues. *M. japonicus* p53 has conserved amino acid residues involving sites for protein dimerization and DNA and zinc binding. In phylogenetic analysis, the homology of the deduced p53 amino acid sequence was not high (67-70%) among crabs, although *M. japonicus* p53 formed a cluster with one clade with p53 homologs from other crabs. Tissue distribution patterns revealed that the highest expression of p53 mRNA transcripts was in the hepatopancreas of *M. japonicus* crabs. Exposure to POPs induced antioxidant defenses to modulate oxidative stress through the upregulation of catalase expression. Furthermore, p53 expression was generally upregulated in the hepatopancreas and gills of *M. japonicus* after exposure to most concentrations of HBCD or BDE-47 for all exposure periods. In hepatopancreas tissue, significant increases in p53 transcript levels were observed as long-lasting apoptotic responses involving cellular defenses until day 7 of relative long-term exposure. The findings in this study suggest that exposure to POPs such as HBCD or BDE-47 may trigger the induction of cellular defense processes against oxidative stress, including DNA repair, cell cycle arrest, and apoptosis through the transcriptional upregulation of p53 expression in *M. japonicus*.

Authors: Kiyun Park, Ihn-Sil Kwak

Full Source: Antioxidants (Basel, Switzerland) 2022 Apr 13;11(4):771. doi: 10.3390/antiox11040771.

Persistent organic pollutants (POPs), some of the most dangerous chemicals released into the aquatic environment, are distributed worldwide due to their environmental persistence and bioaccumulation.

Bulletin Board

Technical

APR. 29, 2022

Environmental Co-Exposure to Potassium Perchlorate and Cd Caused Toxicity and Thyroid Endocrine Disruption in Zebrafish Embryos and Larvae (*Danio rerio*)

2022-04-18

The increasing pollution of aquatic habitats with anthropogenic compounds has led to various test strategies to detect hazardous chemicals. However, information on the effects of pollutants on the thyroid system in fish, which is essential for growth, development, and parts of reproduction, is still scarce. Modified early life-stage tests were carried out with zebrafish exposed to the known thyroid inhibitor potassium perchlorate (0.1, 1, 1.5, 2, 2.5, and 5 mM) to identify adverse effects on embryo development. The endogenous antioxidant defense mechanism is one of the key functions of the thyroid gland; in this regard, we examined the co-exposure to potassium perchlorate (KClO₄), which could disrupt thyroid function, with cadmium (Cd), a known pro-oxidant compound. Zebrafish embryos were exposed to control KClO₄ 1 mM and Cd 0.5 μM for 96 h after fertilization (hpf) individually and in combination. The morphological alteration, body length, and messenger RNA (mRNA) expression related to thyroid function and oxidative stress, thyroid hormone levels, and malondialdehyde were measured. Significant down-regulation of mRNAs related to thyroid function (thyroid hormone receptor-alpha (THRa), thyroid hormone receptor-beta (THRβ), haematopoietically expressed homeobox (hhex)) and decreased thyroxin (T4) levels were observed after co-exposure to KClO₄ and Cd, but this was not observed in the individually treated groups. These results suggest that co-exposure to KClO₄ and Cd could affect antioxidant defense mechanisms and potentially normally increase Cd toxicity on mRNA expression, altering the thyroid functions important in zebrafish embryonic developmental stages.

Authors: Davide Di Paola, Sabrina Natale, Carmelo Iaria, Rosalia Crupi, Salvatore Cuzzocrea, Nunziacarla Spanò, Enrico Gugliandolo, Alessio Filippo Peritore

Full Source: Toxics 2022 Apr 18;10(4):198. doi: 10.3390/toxics10040198.

Comprehensive interpretation of in vitro micronucleus test results for 292 chemicals: from hazard identification to risk assessment application

2022-04-21

Risk assessments are increasingly reliant on information from in vitro assays. The in vitro micronucleus test (MNvit) is a genotoxicity test that

The increasing pollution of aquatic habitats with anthropogenic compounds has led to various test strategies to detect hazardous chemicals.

Bulletin Board

Technical

APR. 29, 2022

detects chromosomal abnormalities, including chromosome breakage (clastogenicity) and/or whole chromosome loss (aneugenicity). In this study, MNvit datasets for 292 chemicals, generated by the US EPA's ToxCast program, were evaluated using a decision tree-based pipeline for hazard identification. Chemicals were tested with 19 concentrations ($n = 1$) up to 200 μM , in the presence and absence of Aroclor 1254-induced rat liver S9. To identify clastogenic chemicals, %MN values at each concentration were compared to a distribution of batch-specific solvent controls; this was followed by cytotoxicity assessment and benchmark concentration (BMC) analyses. The approach classified 157 substances as positives, 25 as negatives, and 110 as inconclusive. Using the approach described in Bryce et al. (Environ Mol Mutagen 52:280-286, 2011), we identified 15 (5%) aneugens. IVIVE (in vitro to in vivo extrapolation) was employed to convert BMCs into administered equivalent doses (AEDs). Where possible, AEDs were compared to points of departure (PODs) for traditional genotoxicity endpoints; AEDs were generally lower than PODs based on in vivo endpoints. To facilitate interpretation of in vitro MN assay concentration-response data for risk assessment, exposure estimates were utilized to calculate bioactivity exposure ratio (BER) values. BERs for 50 clastogens and two aneugens had AEDs that approached exposure estimates (i.e., $\text{BER} < 100$); these chemicals might be considered priorities for additional testing. This work provides a framework for the use of high-throughput in vitro genotoxicity testing for priority setting and chemical risk assessment. Authors: Byron Kuo, Marc A Beal, John W Wills, Paul A White, Francesco Marchetti, Andy Nong, Tara S Barton-Maclaren, Keith Houck, Carole L Yauk Full Source: Archives of toxicology 2022 Apr 21. doi: 10.1007/s00204-022-03286-2.

ENVIRONMENTAL RESEARCH

Assessment of Physicochemical, Microbiological and Toxicological Hazards at an Illegal Landfill in Central Poland

2022-04-15

This study aimed to assess the physicochemical, microbiological and toxicological hazards at an illegal landfill in central Poland. The research included the analysis of airborne dust (laser photometer), the number of microorganisms in the air, soil and leachate (culture method) and the microbial diversity in the landfill environment (high-throughput sequencing on the Illumina Miseq); the cytotoxicity (PrestoBlue) and genotoxicity (alkaline comet assay) of soil and leachate were tested. Moreover, an analysis of UHPLC-Q-ToF-UHRMS (ultra-high-performance

This study aimed to assess the physicochemical, microbiological and toxicological hazards at an illegal landfill in central Poland.

Bulletin Board

Technical

APR. 29, 2022

liquid chromatography-quadrupole-time-of-flight ultrahigh-resolution mass spectrometry) was performed to determine the toxic compounds and microbial metabolites. The PM1 dust fraction constituted 99.89% and 99.99% of total dust and exceeded the threshold of 0.025 mg m^{-3} at the tested locations. In the air, the total number of bacteria was 9.33×10^1 - 1.11×10^3 CFU m^{-3} , while fungi ranged from 1.17×10^2 to 4.73×10^2 CFU m^{-3} . Psychrophilic bacteria were detected in the largest number in leachates (3.3×10^4 to 2.69×10^6 CFU mL^{-1}) and in soil samples (8.53×10^5 to 1.28×10^6 CFU g^{-1}). Bacteria belonging to Proteobacteria (42-64.7%), Bacteroidetes (4.2-23.7%), Actinobacteria (3.4-19.8%) and Firmicutes (0.7-6.3%) dominated. In the case of fungi, Basidiomycota (23.3-27.7%), Ascomycota (5.6-46.3%) and Mortierellomycota (3.1%) have the highest abundance. Bacteria (Bacillus, Clostridium, Cellulosimicrobium, Escherichia, Pseudomonas) and fungi (Microascus, Chrysosporium, Candida, Malassezia, Aspergillus, Alternaria, Fusarium, Stachybotrys, Cladosporium, Didymella) that are potentially hazardous to human health were detected in samples collected from the landfill. Tested leachates and soils were characterised by varied cyto/genotoxins. Common pesticides (carbamazepine, prometryn, terbutryn, permethrin, carbanilide, pyrethrin, carbaryl and prallethrin), quaternary ammonium compounds (benzalkonium chlorides), chemicals and/or polymer degradation products (melamine, triphenylphosphate, diphenylphthalate, insect repellent diethyltoluamide, and drugs (ketoprofen)) were found in soil and leachate samples. It has been proven that the tested landfill is the source of the emission of particulate matter; microorganisms (including potential pathogens) and cyto/genotoxic compounds.

Authors: Justyna Szulc, Małgorzata Okrasa, Adriana Nowak, Joanna Nizioł, Tomasz Ruman, Sławomir Kuberski

Full Source: International journal of environmental research and public health 2022 Apr 15;19(8):4826. doi: 10.3390/ijerph19084826.

Toward Assessing Absolute Environmental Sustainability of Chemical Pollution

2022-04-19

Chemicals are widely used in modern society, which can lead to negative impacts on ecosystems. Despite the urgent relevance for global policy setting, there are no established methods to assess the absolute sustainability of chemical pressure at relevant spatiotemporal scales. We propose an absolute environmental sustainability framework (AESAF) for chemical pollution where (1) the chemical pressure on ecosystems is quantified, (2) the ability for ecosystems to withstand chemical pressure

Chemicals are widely used in modern society, which can lead to negative impacts on ecosystems.

Bulletin Board

Technical

APR. 29, 2022

(i.e., their carrying capacity) is determined, and (3) the “safe space” is derived, wherein chemical pressure is within the carrying capacity and hence does not lead to irreversible adverse ecological effects. This space is then allocated to entities contributing to the chemical pressure. We discuss examples involving pesticide use in Europe to explore the associated challenges in implementing this framework (e.g., identifying relevant chemicals, conducting analyses at appropriate spatiotemporal scales) and ways forward (e.g., chemical prioritization approaches, data integration). The proposed framework is the first step toward understanding where and how much chemical pressure exceeds related ecological limits and which sources and actors are contributing to the chemical pressure. This can inform sustainable levels of chemical use and help policy makers establish relevant and science-based protection goals from regional to global scale.

Authors: Marissa B Kosnik, Michael Zwicky Hauschild, Peter Fantke
Full Source: Environmental science & technology 2022 Apr 19;56(8):4776-4787. doi: 10.1021/acs.est.1c06098.

PHARMACEUTICAL/TOXICOLOGY

Residence in an Area with Environmental Exposure to Heavy Metals and Neurobehavioral Performance in Children 9-11 Years Old: An Explorative Study

2022-04-14

We explored the association between residence in an area polluted with metals and neurobehavioral performance in children aged 9 to 11. A cross-sectional study was conducted with thirty boys and thirty girls aged 9 to 11 from public schools in a heavily industrialized area, matched by age (± 4 months) and gender with 15 boys and 15 girls from public schools in cities without relevant industrial activity. Neurobehavioral performance was assessed with the Behavioral Assessment and Research System. Linear regression models were used, adjusting for age, sex, social class and multimedia activities to predict each of the neurobehavioral outcome variables. No differences in neurobehavioral performance were found when all children with residence in areas with environmental exposure to metals were classified as exposed and the children from the other provinces as unexposed. However, when we compared children living ≤ 1 km from an industrial area with respect to those living more than 1 km away, significant differences were found. Children living ≤ 1 km away had lower scores on Finger Tapping ($p = 0.03$), Symbol-Digit ($p = 0.07$)

We explored the association between residence in an area polluted with metals and neurobehavioral performance in children aged 9 to 11.

Bulletin Board

Technical

APR. 29, 2022

and Continuous Performance ($p = 0.02$) than those living farther away. Our results support the hypothesis that residing close to an area with industrial activity (≤ 1 km) is associated with deficits in neurobehavioral performance among children aged 9 to 11.

Authors: Rocío Capelo, Diane S Rohlman, Rocío Jara, Tamara García, Jesús Viñas, José A Lorca, Manuel Contreras Llanes, Juan Alguacil
Full Source: International journal of environmental research and public health 2022 Apr 14;19(8):4732. doi: 10.3390/ijerph19084732.

OCCUPATIONAL

The Exposure of Workers at a Busy Road Node to PM 2.5: Occupational Risk Characterisation and Mitigation Measures

2022-04-12

The link between air pollution and health burden in urban areas has been well researched. This has led to a plethora of effective policy-induced monitoring and interventions in the global south. However, the implication of pollutant species like PM_{2.5} in low middle income countries (LMIC) still remains a concern. By adopting a positivist philosophy and deductive reasoning, this research addresses the question, to what extent can we deliver effective interventions to improve air quality at a building structure located at a busy road node in a LMIC? This study assessed the temporal variability of pollutants around the university environment to provide a novel comparative evaluation of occupational shift patterns and the use of facemasks as risk control interventions. The findings indicate that the concentration of PM_{2.5}, which can be as high as 300% compared to the WHO reference, was exacerbated by episodic events. With a notable decay period of approximately one-week, adequate protection and/or avoidance of hotspots are required for at-risk individuals within a busy road node. The use of masks with 80% efficiency provides sufficient mitigation against exposure risks to elevated PM_{2.5} concentrations without occupational shift, and 50% efficiency with at least '2 h ON, 2 h OFF' occupational shift scenario.

Authors: Obuks A Ejohwomu, Majeed Oladokun, Olalekan S Oshodi, Oyegoke Teslim Bukoye, David John Edwards, Nwabueze Emekwuru, Olumide Adenuga, Adegboyega Sotunbo, Ola Uduku, Mobolanle Balogun, Rose Alani

Full Source: International journal of environmental research and public health 2022 Apr 12;19(8):4636. doi: 10.3390/ijerph19084636.

The link between air pollution and health burden in urban areas has been well researched.

Bulletin Board

Technical

APR. 29, 2022

Cognitive Functioning and Nail Salon Occupational Exposure among Vietnamese Immigrant Women in Northern California

2022-04-12

Introduction: Vietnamese nail salon technicians are continuously exposed to neurotoxins linked to cognitive impairments and Alzheimer's disease. This study examined the association of occupational exposure with cognitive function and depressive symptoms among Vietnamese nail salon technicians. Methods: The sample included 155 current or former Vietnamese female nail technicians and 145 control group participants. Measures included the Montreal Cognitive Assessment (MoCA) and the Center for Epidemiologic Studies Depression Scale (CES-D). Results: Average cognitive functioning was significantly higher for the control compared to the nail technician group (mean difference = 1.2, $p < 0.05$). No differences were observed for depression. Multivariate findings revealed that exposure was negatively associated with cognitive functioning ($\beta = -0.29$, 95% CI: -0.53, -0.05, $p < 0.05$). Discussion: Nail salon work and the extent of occupational exposure were associated with lower cognitive functioning among Vietnamese nail technicians. Longitudinal research can further examine the risk for cognitive decline and dementia for this vulnerable population.

Authors: Thuc-Nhi Nguyen, Shuai Chen, Keith Chan, Mai Tram Nguyen, Ladson Hinton

Full Source: International journal of environmental research and public health 2022 Apr 12;19(8):4634. doi: 10.3390/ijerph19084634.

Radon exposure and risk of cerebrovascular disease: a systematic review and meta-analysis in occupational and general population studies

2022-04-23

Although it is biologically plausible, findings relating radon exposure to the risk of cerebrovascular disease (CeVD) are inconsistent and inconclusive. To investigate whether radon exposure was associated with the risk of CeVD, we qualitatively and quantitatively summarized the literature on radon and CeVD in both occupational and general populations. A search of PubMed, Embase, Scopus, and Web of Science was performed for peer-reviewed articles published through March 2022. Studies were excluded if radon exposure was not assessed separately from other ionizing radiation. In the meta-analysis, excess relative risks (ERRs) were converted to relative risks (RRs), and the pooled RRs and 95%

Introduction: Vietnamese nail salon technicians are continuously exposed to neurotoxins linked to cognitive impairments and Alzheimer's disease.

Bulletin Board

Technical

APR. 29, 2022

confidence intervals (CIs) were determined using the random-effects model (DerSimonian and Laird). In the systematic review, nine eligible studies were summarized. Six occupational studies indicated inconsistent associations between cumulative radon exposure and CeVD mortality among mine workers. With available data from four updated occupational studies (99,730 mine workers and 2745 deaths), the pooled RR of radon exposure with CeVD mortality showed a non-significant association (1.10, 95% CI 0.92, 1.31). Three studies (841,270 individuals and 24,288 events) conducted in general populations consistently demonstrated a significant inverse relationship between residential radon exposure and risk of CeVD. The existing literature suggested a potential link between radon exposure and CeVD risk in general population. The inconsistent association in occupationally exposed populations may be explained by different methods of radon assessment and other methodological issues. Since radon exposure is a common public health issue, more rigorously designed epidemiologic studies, especially in the general population are warranted.

Authors: Liping Lu, Yijia Zhang, Cheng Chen, Robert William Field, Ka Kahe
Full Source: Environmental science and pollution research international 2022 Apr 23. doi: 10.1007/s11356-022-20241-x.

Welder's Anthrax: A Review of an Occupational Disease

2022-03-26

Since 1997, nine cases of severe pneumonia, caused by species within the *B. cereus* group and with a presentation similar to that of inhalation anthrax, were reported in seemingly immunocompetent metalworkers, with most being welders. In seven of the cases, isolates were found to harbor a plasmid similar to the *B. anthracis* pXO1 that encodes anthrax toxins. In this paper, we review the literature on the *B. cereus* group spp. pneumonia among welders and other metalworkers, which we term welder's anthrax. We describe the epidemiology, including more information on two cases of welder's anthrax in 2020. We also describe the health risks associated with welding, potential mechanisms of infection and pathological damage, prevention measures according to the hierarchy of controls, and clinical and public health considerations. Considering occupational risk factors and controlling exposure to welding fumes and gases among workers, according to the hierarchy of controls, should help prevent disease transmission in the workplace.

Authors: Marie A de Perio, Katherine A Hendricks, Chad H Dowell, William A Bower, Nancy C Burton, Patrick Dawson, Caroline A Schrodt, Johanna

Since 1997, nine cases of severe pneumonia, caused by species within the *B.*

Bulletin Board

Technical

APR. 29, 2022

S Salzer, Chung K Marston, Karl Feldmann, Alex R Hoffmaster, James M Antonini

Full Source: Pathogens (Basel, Switzerland) 2022 Mar 26;11(4):402. doi: 10.3390/pathogens11040402.