

# Bulletin Board

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## CHEMICAL EFFECTS

## Monitoring and risk assessment of hazardous chemicals in toy-slime and putty in The Netherlands

2021-07-04

In 2019, the Dutch Food and Consumer Product Safety Authority performed a market surveillance for toy-slime (23 samples) and putty (16 samples). For 35% of the toy-slimes and 13% of the putties, the migration of boron exceeded the European legal limit of 300 and 1,200 mg/kg respectively. In 36% of the toy samples, methylisothiazolinone (MI) and chloromethylisothiazolinone (CMI) were detected in levels up to 25 and 38 mg/kg, respectively, much higher than the European legal limit for aqueous toys intended for children younger than three. 59% of the toys contained other preservatives such as 2-phenoxyethanol, p-hydroxybenzoic acid and parabens. In 2 toy-slimes and 2 putties N-nitrosodiethanolamine (NDELA) was found in amounts up to 2.3 mg/kg. A risk assessment was performed for boron and NDELA. The estimated exposure to boron did not exceed the health based guidance value. The estimated exposure to NDELA from 2 toy-slimes may pose a health risk. For 2 putties the estimated exposure to NDELA was somewhat lower, but health risks could not be excluded. The presence of isothiazolinones may lead to skin sensitisation. It is recommended to extend the legal limit for NDELA, MI and CMI in finger-paint and labelling requirements to other aqueous toys.

Authors: M W den Braver, D J Schakel, H S Hendriks, A G Schuur, W Brand, D T H M Sijm, K Bouma

Full Source: Regulatory toxicology and pharmacology : RTP 2021 Jul 4;105000. doi: 10.1016/j.yrtph.2021.105000.

## Isolation and characterization of marine bioluminescent bacteria for toxicity bioassays and biotechnological applications

2021-07-07

Toxic heavy metals pollution posed severe health hazards to the environment and biodiversity. Therefore, the development of rapid and non-invasive bioassays is in the race to monitor toxic chemicals using novel approaches. This study isolated and characterized an intense blue luminescence-producing marine bacteria, *Vibrio campbellii* STF1, for biosensing applications. Species-level identification of this strain was confirmed based on various phenotypic tests and multilocus sequence

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approach using 16s rRNA, toxR, and luxA gene sequence analysis. Fatty acid methyl ester analysis revealed the presence of three predominant fatty acids C15:0 anteiso (21.73%), C17:0 anteiso (11.27%), and C19:0 anteiso (9.08%) in STF1. Luciferase enzyme from *V. campbellii* STF1 was extracted, partially purified, and molecular masses (alpha subunit 40 kDa and beta subunit 37 kDa) were determined by SDS-PAGE gel for in vivo assays. MALDI-TOF-MS analysis of *V. campbellii* cells' protein extracts showed distinct mass spectral peaks at m/z of 2615, 3948, and 4232 da. *V. campbellii* STF1 is resistant to heavy metal lead, while other metals such as cadmium, copper, and mercury inhibited its growth and luminescence. Crude ethyl acetate extraction of *V. campbellii* demonstrated antibacterial activity against *Shigella dysenteriae* type 5 with a maximum inhibition zone of  $27.0 \pm 1.0$  mm.

Authors: Chatragadda Ramesh, Raju Mohanraju

Full Source: Brazilian journal of microbiology : [publication of the Brazilian Society for Microbiology] 2021 Jul 7. doi: 10.1007/s42770-021-00471-w.

## Occurrence, spatial distribution and risk assessment of high concern endocrine-disrupting chemicals in Jiangsu Province, China

2021-06-30

Endocrine-disrupting chemicals (EDCs) have attracted much concern because of the environmental and health risks they pose. Here we used liquid chromatography coupled with quadrupole-Orbitrap high-resolution mass spectrometry to quantify 10 types of EDCs at 118 sampling sites in Jiangsu Province, China, and then evaluated their respective environmental risk using a conservative risk quotient method. The results show that, in surface water, the targeted nonylphenol (NP), 4-tert-octylphenol (4-t-OP), and (2-ethylhexyl)phthalate (DEHP) were ranked highest, having mean concentrations above 300 ng/L. In comparison, both 4-t-OP and DEHP were also ranked highest, with mean concentrations above 100 ng/g, in the sediment samples. Moreover, the  $\Sigma 10$ EDCs concentration in the Huai River Basin was similar to that in the Yangtze River Basin. Notably, Huai'an city had the maximum mean concentration for EDCs in the Huai River Basin, followed by Xuzhou city and Suqian city, while Yangzhou city ranked highest in the Yangtze River Basin. Furthermore, the corresponding risk distribution revealed that (1) NP, bisphenol A (BPA), and 4-t-OP are of medium to high risk in 70%, 100% and 95% of the surface water samples, and likewise in 45%, 88% and 100% of the sediment samples, respectively; the maximum RQ value for NP in surface water samples reached 74.9; (2) DEHP belongs to the high-

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risk category in all samples (100%), whose maximum RQ reached 54.7. To our best knowledge, this is the first study to report on the occurrence, spatial distribution, and risk assessment of EDCs of high concern in Jiangsu Province, China.

Authors: Deling Fan, Wei Yin, Wen Gu, Mingqing Liu, Jining Liu, Zhen Wang, Lili Shi

Full Source: Chemosphere 2021 Jun 30;285:131396. doi: 10.1016/j.chemosphere.2021.131396.

### Cardiotoxicity of some pesticides and their amelioration

2021-07-06

Pesticides are used to control pests that harm plants, animals, and humans. Their application results in the contamination of the food and water systems. Pesticides may cause harm to the human body via occupational exposure or the ingestion of contaminated food and water. Once a pesticide enters the human body, it may create health consequences such as cardiotoxicity. There is not enough information about pesticides that cause cardiotoxicity in the literature. Currently, there are few reports that summarized the cardiotoxicity due to some pesticide groups. This necessitates reviewing the current literature regarding pesticides and cardiotoxicity and to summarize them in a concrete review. The objectives of this review article were to summarize the advances in research related to pesticides and cardiotoxicity, to classify pesticides into certain groups according to cardiotoxicity, to discuss the possible mechanisms of cardiotoxicity, and to present the agents that ameliorate cardiotoxicity. Approximately 60 pesticides were involved in cardiotoxicity: 30, 13, and 17 were insecticides, herbicides, and fungicides, respectively. The interesting outcome of this study is that 30 and 13 pesticides from toxicity classes II and III, respectively, are involved in cardiotoxicity. The use of standard antidotes for pesticide poisoning shows health consequences among users. Alternative safe medical management is the use of cardiotoxicity-ameliorating agents. This review identifies 24 ameliorating agents that were successfully used to manage 60 cases. The most effective agents were vitamin C, curcumin, vitamin E, quercetin, selenium, chrysin, and garlic extract. Vitamin C showed ameliorating effects in a wide range of toxicities. The exposure mode to pesticide residues, where 1, 2, 3, and 4 are aerial exposure to pesticide drift, home and/or office exposure, exposure due to drinking contaminated water, and consumption of contaminated food, respectively. General cardiotoxicity is represented by 5, whereas 6, 7, 8 and 9 are electrocardiogram (ECG) of hypotension due to exposure to OP residues, ECG of myocardial infraction due to exposure to OPs,

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ECG of hypertension due to exposure to OC and/or PY, and normal ECG respectively.

Authors: Yasser El-Nahhal, Ibrahim El-Nahhal

Full Source: Environmental science and pollution research international 2021 Jul 6. doi: 10.1007/s11356-021-14999-9.

### ENVIRONMENTAL RESEARCH

#### Spatial-temporal patterns of ambient fine particulate matter (PM 2.5) and black carbon (BC) pollution in Accra

2021-07

Sub-Saharan Africa (SSA) is rapidly urbanizing, and ambient air pollution has emerged as a major environmental health concern in growing cities. Yet, effective air quality management is hindered by limited data. We deployed robust, low-cost and low-power devices in a large-scale measurement campaign and characterized within-city variations in fine particulate matter (PM<sub>2.5</sub>) and black carbon (BC) pollution in Accra, Ghana. Between April 2019 and June 2020, we measured weekly gravimetric (filter-based) and minute-by-minute PM<sub>2.5</sub> concentrations at 146 unique locations, comprising of 10 fixed (1 year) and 136 rotating (7 day) sites covering a range of land-use and source influences. Filters were weighed for mass, and light absorbance (10-5m<sup>-1</sup>) of the filters was used as proxy for BC concentration. Year-long data at four fixed sites that were monitored in a previous study (2006-2007) were compared to assess changes in PM<sub>2.5</sub> concentrations. The mean annual PM<sub>2.5</sub> across the fixed sites ranged from 26 µg m<sup>-3</sup> at a peri-urban site to 43 µg m<sup>-3</sup> at a commercial, business, and industrial (CBI) site. CBI areas had the highest PM<sub>2.5</sub> levels (mean: 37 µg m<sup>-3</sup>), followed by high-density residential neighborhoods (mean: 36 µg m<sup>-3</sup>), while peri-urban areas recorded the lowest (mean: 26 µg m<sup>-3</sup>). Both PM<sub>2.5</sub> and BC levels were highest during the dry dusty Harmattan period (mean PM<sub>2.5</sub>: 89 µg m<sup>-3</sup>) compared to non-Harmattan season (mean PM<sub>2.5</sub>: 23 µg m<sup>-3</sup>). PM<sub>2.5</sub> at all sites peaked at dawn and dusk, coinciding with morning and evening heavy traffic. We found about a 50% reduction (71 vs 37 µg m<sup>-3</sup>) in mean annual PM<sub>2.5</sub> concentrations when compared to measurements in 2006-2007 in Accra. Ambient PM<sub>2.5</sub> concentrations in Accra may have plateaued at levels lower than those seen in large Asian megacities. However, levels are still 2- to 4-fold higher than the WHO guideline. Effective and equitable policies are needed to reduce pollution levels and protect public health.

Authors: Abosede S Alli, Sierra N Clark, Allison Hughes, James Nimo, Josephine Bedford-Moses, Solomon Baah, Jiayuan Wang, Jose Vallarino,

Sub-Saharan Africa (SSA) is rapidly urbanizing, and ambient air pollution has emerged as a major environmental health concern in growing cities.

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Ernest Agyemang, Benjamin Barratt, Andrew Beddows, Frank Kelly, George Owusu, Jill Baumgartner, Michael Brauer, Majid Ezzati, Samuel Agyei-Mensah, Raphael E Arku

Full Source: Environmental research letters : ERL [Web site] 2021 Jul;16(7):074013. doi: 10.1088/1748-9326/ac074a.

### Acute cardiovascular effects of traffic-related air pollution (TRAP) exposure in healthy adults: A randomized, blinded, crossover intervention study

2021-07-01

Exposure to traffic-related air pollution (TRAP) may enhance the risk of cardiovascular disease. However, the short-term effects of TRAP components on the cardiovascular system are not well understood. We conducted a randomized, double-blinded, crossover intervention study in which 39 healthy university students spent 2 h next to a busy road. Participants wore a powered air-purifying respirator (PAPR) or an N95 mask. PAPRs were equipped with a filter for particulate matter (PM), a PM and volatile organic compounds (VOCs) filter or a sham filter. Participants were blinded to PAPR filter type and underwent randomized exposures four times, once for each intervention mode. Blood pressure (BP), heart rate (HR) and heart rate variability (HRV) were measured before, during and for 6 h after the roadside exposure. Linear mixed-effect models were used to evaluate the effects of the interventions relative to baseline controlling for other covariates. All HRV measures increased during and following exposure for all intervention modes. Some HRV measures (SDNN and rMSSD during exposure and SDNN after exposure) were marginally affected by PM filtration. Wearing the N95 mask affected VLF power and rMSSD responses to traffic exposure differently than the PAPR interventions. Both systolic and diastolic BP increased slightly during exposure, but then were generally lower than baseline after exposure for the sham and filter interventions. HR, which fell during exposure and mostly remained lower than baseline after exposure, was lower yet with all filter interventions compared to the sham mode following exposure. Therefore, short-term exposure to traffic acutely affects HRV, BP and HR, but N95 mask and PAPR interventions generally show little efficacy in reducing these effects. Removing the PM component of TRAP has some limited effects on HRV responses to exposure but exaggerates the traffic-

Exposure to traffic-related air pollution (TRAP) may enhance the risk of cardiovascular disease.

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related decrease in HR. HRV findings from N95 mask interventions need to be interpreted cautiously.

Authors: Bin Han, Ruojie Zhao, Nan Zhang, Jia Xu, Liwen Zhang, Wen Yang, Chunmei Geng, Xinhua Wang, Zhipeng Bai Dr, Sverre Vedal

Full Source: Environmental pollution (Barking, Essex : 1987) 2021 Jul 1;288:117583. doi: 10.1016/j.envpol.2021.117583.

### OCCUPATIONAL

#### Assessment of crab fishermen's exposure to rabies virus in a typical Amazonian community

2021-07-09

Outbreaks of human rabies transmitted by hematophagous bats occurred in 2018 in Pará state, Brazil, eastern Amazon, after 12 years of no record of the disease. Thus, it is necessary to understand the epidemiological characteristics of these attacks to protect the local population. This study aimed to characterize the bat bite populations in the municipality of São João da Ponta, Pará State, Brazil, in 2013-2015. The Notifiable Diseases Information System (SINAN) database was used to identify the five individuals who sought medical care during the study period (seeds). Other individuals who were attacked during the same period but did not seek medical care (n = 61) were reached by snowball sampling, and a descriptive analysis was performed based on information obtained from questionnaires. Majority of the interviewees were men (92.4%; 61/66) and adults aged 20-50 years (69.9%; 46/66) and had <4 years of formal school education (86.3%; 57/66). Additionally, most of them were rural residents (92.4%; 61/66) and crab fishermen (79.3%; 53/66). The interviewees (92.4%; 61/66) identified mangroves of the Mãe Grande de Curuçá extractive reserve, where groups of fishermen sometimes gather for several days for crab fishing, often living in improvised dwellings without walls and covered by tarps or straw (88.8%; 56/66), conducive to attacks by vampire bats. Overall, 42.4% (28/66) of the participants had been bitten more than four times throughout their life. The median number of attacks over the participant's lifetime was 3.11 (range, 1-23). Participants were unaware of the risk of contracting rabies from the bite (95.4%; 65/66). These results suggest that vampire bat attacks are essentially an occupational hazard in the study region. Moreover, for each reported attack, there were at least

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12.2 unreported cases. Thus, the study highlights the need to develop strategies for prophylactic treatment of this population.

Authors: Nailde de Paula Silva, Elane de Araújo de Andrade, Denis Cardoso, Ruth Cavalcante Silva Guimarães, Mateus Borges Silva, Kelly Karoline Gomes Nascimento, Diego de Arruda Xavier, Isis Abel  
Full Source: Zoonoses and public health 2021 Jul 9. doi: 10.1111/zph.12869.

### Registration status, mercury exposure biomarkers, and neuropsychological assessment of artisanal and small-scale gold miners (ASGM) from the Western Region of Ghana

2021-07-07

The artisanal and small-scale gold mining (ASGM) sector is estimated to be the largest anthropogenic source of mercury pollution worldwide, and not surprisingly human exposures in this sector are amongst the highest of all population groups. While formalization of the sector has been proposed as a solution to help improve health and safety within ASGM sites, there are few empirical studies in support of this notion. The objective of this study was to assess if individuals working in ASGM sites that are registered have reduced mercury exposures and better neuropsychological scores than workers from unregistered sites. To achieve this objective, we studied biological samples (urine, hair) and survey data from a study of 404 ASGM workers (of which, 295 worked in registered ASGM sites) conducted in Tarkwa (Ghana) in 2014. Between miners working in registered and unregistered sites, there were few differences in socio-demographic characteristics. Median urinary mercury concentration (specific gravity-corrected) among those from unregistered mines was nearly 3-fold higher than those from the registered mines (18.5 versus 6.6 µg/L), and in the overall population the median concentration was 10.0 µg/L, and ranged from 0.3 to 2499 µg/L. Mercury biomarkers varied across ASGM work categories (e.g., those who burned or amalgamated had the highest) and users of personal protective equipment. Nearly 30% of the study population indicated having some challenges concerning, for example, reduced appetite, hair loss, or excess salivation. Ataxia and rigidity of gait were absent in most of the participants, and for those with slight, moderate, or marked responses, there were no differences between miners from registered and unregistered sites, across work groups, as well as in reference to mercury biomarker measures. For the pencil tapping, Frostig, matchbox, and Wechsler tests, no striking differences were found though a correlation was found between urinary mercury levels and matchbox scores among those who amalgamate and burn, and scores were similar to

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past studies using the same tests in ASGM sites. We believe this is the first study to compare mercury exposures and neuropsychological test results between miners from registered and unregistered ASGM sites. In doing so, the research findings provide the necessary evidence for stakeholders and parties of the Minamata Convention considering various response options to help fulfill their obligations.

Authors: Laretta Ovadje, Benedict NI Calys-Tagoe, Edith Clarke, Niladri Basu

Full Source: Environmental research 2021 Jul 7;111639. doi: 10.1016/j.envres.2021.111639.

### PHARMACEUTICAL/TOXICOLOGY

#### Estimation of the dose of electronic cigarette chemicals deposited in human airways through passive vaping

2021-07-08

Background: Existing studies on the health effects of e-cigarettes focused on e-cigarette users themselves. To study the corresponding effects on passive vapers, it is crucial to quantify e-cigarette chemicals deposited in their airways.

Objective: This study proposed an innovative approach to estimate the deposited dose of e-cigarette chemicals in the passive vapers' airways. The effect of the distance between active and passive vapers on the deposited dose was also examined.

Methods: The chemical constituent analysis was conducted to detect Nicotine and flavoring agents in e-cigarette aerosol. The Mobile Aerosol Lung Deposition Apparatus (MALDA) was employed to conduct aerosol respiratory deposition experiments in real-life settings to generate real-time data. Results: For e-cigarette aerosol in the ultrafine particle regime, the deposited doses in the alveolar region were on average 3.2 times higher than those in the head-to-TB airways, and the deposited dose in the passive vaper's airways increased when being closer to the active vaper.

Significance: With prolonged exposure and close proximity to active vapers, passive vapers may be at risk for potential health effects of harmful e-cigarette chemicals. The methodology developed in this study has laid

Background: Existing studies on the health effects of e-cigarettes focused on e-cigarette users themselves.

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the groundwork for future research on exposure assessment and health risk analysis for passive vaping.

Authors: Wei-Chung Su, Ying-Hsuan Lin, Su-Wei Wong, Jin Y Chen, Jinho Lee, Anne Buu

Full Source: Journal of exposure science & environmental epidemiology 2021 Jul 8. doi: 10.1038/s41370-021-00362-0.

### Hair determination of per- and polyfluoroalkyl substances (PFAS) in the Italian population

2021-07-01

Per- and polyfluoroalkyl substances (PFAS) are anthropogenic chemicals present in the environment and defined as persistent organic pollutants (POPs). The interest in these forms of contaminants is related to the toxic consequences for health derived from exposures and bioaccumulation processes. The present research aims at assessing differences in the exposure of PFAS in the Italian population by hair analyses. To this aim, 20 compounds of the PFAS family were investigated in hair of 86 Italian subjects distributed across the regions of Veneto, Emilia-Romagna, Lombardy and Marche. The applied method was ad hoc developed in a previous research and included SPE extraction and LC-QTOF analysis. In the analyzed population, 66.4 % had quantifiable amounts of one or more PFAS molecules (up to 4 compounds); mean PFAS content, expressed as sum of PFAS, was 0.1457 ng/g, ranging from "not detected" to 0.85 ng/g (SD 0.1867). PFOA and PFOS were the chemicals most frequently detected, with mean concentrations of 0.1402 ng/g and 0.1155 ng/g, respectively. PFBA was detected in 9.3 % of subjects with a mean concentration of 0.3760 ng/g; PFNA in 3.5 % of subjects with mean concentration 0.12 ng/g; PFDA was found in one subject at the concentration of 0.541 ng/g. PFUnA and PFHxS were detected below the limit of quantification. The overall results displayed differences in the presence and prevalence of PFAS in hair of the Italian population on a geographical base. On the contrary, no significant differences in the amount of PFAS were observed when considering gender or age classes. On this base, hair can be considered a good diagnostic tool to assess PFAS exposure on a regional-scaled base. Of course, more studies are required to infer PFAS internal dose from hair results due to its peculiar detection window and to interpretative issues derived from external contamination.

Authors: E Piva, A Giorgetti, P Ioime, L Morini, F Freni, F Lo Faro, F Pirani, M Montisci, P Fais, J P Pascali

Full Source: Toxicology 2021 Jul 1;458:152849. doi: 10.1016/j.tox.2021.152849.

Per- and polyfluoroalkyl substances (PFAS) are anthropogenic chemicals present in the environment and defined as persistent organic pollutants (POPs).