

# Bulletin Board

## Contents

APR. 15, 2022

(click on page numbers for links)

### CHEMICAL EFFECTS

Chemicals in the Home That Can Exacerbate Asthma.....	3
Historical exposure to chemicals reduces tolerance to novel chemical stress in <i>Daphnia</i> (waterflea).....	3

### ENVIRONMENTAL RESEARCH

Live in same region, respond differently: Canine and human response to pollutants in placental accumulation.....	4
Evaluation of cytokines in exhaled breath condensate in an occupationally exposed population to pneumotoxic pollutants.....	5

### PHARMACEUTICAL/TOXICOLOGY

Head and neck cancer and asbestos exposure .....	6
Exploring the origin of efficient adsorption of poly- and perfluoroalkyl substances in household point-of-use water purifiers: Deep insights from a joint experimental and computational study.....	7

### OCCUPATIONAL

Toxicopathological changes induced by combined exposure to noise and toluene in New Zealand White rabbits .....	8
Assessing Exposures from the Deepwater Horizon Oil Spill Response and Clean-up.....	8
Telomere fragility in radiology workers occupationally exposed to low doses of ionising radiation .....	9
Obesity II: Establishing Causal Links Between Chemical Exposures and Obesity .....	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. 15, 2022

## CHEMICAL EFFECTS

## Chemicals in the Home That Can Exacerbate Asthma

2022-04-08

Although chemical exposures from cleaning and disinfectant products often go unnoticed or unrecognized, such exposures have been associated with asthma-related symptoms and exacerbations. The Environmental Working Group (EWG) website provides consumer information on a wide range of issues and products related to human health and the environment, including the use of cleaning and disinfectant products, 2,500 of which it has rated in terms of their effects on respiratory function and asthma. In discussing how the use of cleaning and disinfectant products and the frequency of their use may affect asthma control, the authors use the EWG ratings as well as data collected for a study they conducted on older adults with asthma.

Authors: Barbara J Polivka, Luz Huntington-Moskos, Rodney Folz, Russel Barnett

Full Source: The American journal of nursing 2022 Apr 8; Published Ahead of Print. doi: 10.1097/01.NAJ.0000829776.73698.e0.

Historical exposure to chemicals reduces tolerance to novel chemical stress in *Daphnia* (waterflea)

2022-04-04

Until the last few decades, anthropogenic chemicals used in most production processes didn't have a comprehensive assessment of their risk and impact on wildlife and humans. They are transported globally and usually end up in the environment as unintentional pollutants causing long-term adverse effects. Modern toxicology practises typically use acute toxicity tests of unrealistic concentrations of chemicals to determine their safe use, missing pathological effects arising from long-term exposures to environmentally relevant concentrations. Here, we study the transgenerational effect of environmentally relevant concentrations of five chemicals on the priority list of international regulatory frameworks on the keystone species *Daphnia magna*. We expose *Daphnia* genotypes resurrected from the sedimentary archive of a lake with a known history of chemical pollution to the five chemicals to understand how historical exposure to chemicals influences adaptive responses to novel chemical stress. We measure within and transgenerational plasticity in fitness-linked life history traits following exposure of 'experienced' and 'naive' genotypes to novel chemical stress. As the revived *Daphnia* originates from the same

Although chemical exposures from cleaning and disinfectant products often go unnoticed or unrecognized, such exposures have been associated with asthma-related symptoms and exacerbations.

## Bulletin Board

## Technical

APR. 15, 2022

genetic pool sampled at different times in the past, we are able to quantify the long-term evolutionary impact of chemical pollution by studying genome-wide diversity and identifying functional pathways affected by historical chemical stress. Our results suggest that historical exposure to chemical stress causes reduced genome-wide diversity, leading to lower cross-generational tolerance to novel chemical stress. Lower tolerance is underpinned by reduced gene diversity at detoxification, catabolism and endocrine genes in experienced genotypes. We show that these genes sit within pathways that are conserved and potential chemical targets in other species, including humans.

Authors: Muhammad Abdullahi, Jiarui Zhou, Vignesh Dandhapani, Anurag Chaturvedi, Luisa Orsini

Full Source: Molecular ecology 2022 Apr 4. doi: 10.1111/mec.16451.

## ENVIRONMENTAL RESEARCH

## Live in same region, respond differently: Canine and human response to pollutants in placental accumulation

2022-03-31

Polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), polybrominated diphenyl ethers (PBDEs), and polycyclic aromatic hydrocarbons (PAHs) are endocrine-disrupting chemicals (EDCs). Their presence in the environment is particularly concerning in cases of fetal exposure, which is the most vulnerable period of life for both human and animals who share the same environment. Placenta, as a sample collected using noninvasive methods to screen EDCs, is a good indicator for potential fetal exposure. Although recent studies indicate that companion animal may correspond to human exposure, species-specific anatomo-morphological and metabolic differences are controversial. In this study, placenta samples of 60 women and 25 dogs living and giving birth within the same region were evaluated for the presence of PCB, OCP, PBDE, and PAH residues; where, socio-demographic factors were also assessed to identify the possible sources. Gas chromatography-mass spectrometry method was validated for the matrix, and among 45 screened and targeted pollutants, only 18 were found in human placentas. While the most frequently detected pollutants were DDTs, followed by PAHs and PCBs in decreasing order, the pollutants with the highest concentrations were PAHs, followed by PCBs and DDTs. Only five of the target contaminants were detected in the dog placentas. These results indicate that; as dogs have different bioaccumulation capacities and higher excretion rates than humans, the life-long effects of exposure

Polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), polybrominated diphenyl ethers (PBDEs), and polycyclic aromatic hydrocarbons (PAHs) are endocrine-disrupting chemicals (EDCs).

## Bulletin Board

## Technical

APR. 15, 2022

to endocrine compound and possible consequences related to adverse health outcomes are expected to vary and concentrations cannot be directly correlated.

Authors: Begum Yurdakok-Dikmen, Ozgur Kuzukiran, Recep Uyar, Ummu Gulsum Boztepe, Hasan Tolga Çelik, Ozgur Ozyuncu, Yagmur Turgut, Halit Kanca, Kubra Karakas-Alkan, Ayhan Filazi

Full Source: Chemosphere 2022 Mar 31;134470. doi: 10.1016/j.chemosphere.2022.134470.

### Evaluation of cytokines in exhaled breath condensate in an occupationally exposed population to pneumotoxic pollutants

2022-04-09

The quarrying is considered a precarious occupation with high toxicity, is an informal economic activity that employs low technology, limited protection, and poses a risk to workers and their families. In quarrying, silica dust is generated and there is also occupational exposure to significant mixtures of pneumotoxic pollutants, including mineral dust (crystalline silica, carbon or cement, polycyclic aromatic hydrocarbons (PAHs), solvents, and others, which are aggravated by the lack of use of protective equipment, causing irreversible damage to the worker's respiratory health. Thus, the objective of this work focused on the evaluation of the respiratory health of artisan stonemasons in San Luis Potosí, Mexico through the study of exhaled breath condensate (EBC) (pH, pro-inflammatory cytokines) as well as the study of the exposure to pollutants present in the work area (PAHs, toluene, and 2.5 µm particulate matter) through biomarkers of exposure (hippuric acid and hydroxylated metabolites of PAHs). The results show the presence of crystalline SiO<sub>2</sub> in 100% of the samples analyzed; the PM<sub>2.5</sub> concentrations were 5 to 10 times the permitted levels. Regarding exposure to PAHs, all the stonemasons presented urine concentrations of at least 5 of the OH-PAHs evaluated; 9-OH-FLU occurred at higher concentrations of 171.2 (122.7-279.4) µg L<sup>-1</sup>; hippuric acid, which was present in 100% of the workers evaluated in concentrations of 283.4 (27.72-1119) mg L<sup>-1</sup>, 100% of which were above the values established for occupational scenarios. The pH values obtained for the EBC samples were presented at an average of 7.07 (6.33-7.66). Pro-inflammatory cytokines were present in 86.1% of the study population. The cytokine that was found in higher concentrations was IL-2, with a mean of 178.01 pg mL<sup>-1</sup> and 3124.01 pg mL<sup>-1</sup> for the pH < 7 and pH > 7 groups, respectively. Some correlations between the cytokines and the exposure biomarkers were presented. Stonemasons are highly exposed to

The quarrying is considered a precarious occupation with high toxicity, is an informal economic activity that employs low technology, limited protection, and poses a risk to workers and their families.

## Bulletin Board

## Technical

APR. 15, 2022

pneumotoxic pollutants and markers of inflammation at the pulmonary level; in addition, a high risk of developing silicosis. Quarrying should be addressed as a carcinogenic activity, which would imply the design of monitoring and control strategies for these pollutants that our country currently lacks, particularly in precarious occupations. It is necessary to develop strategies to protect the health of precarious workers.

Authors: Lorena Díaz de León-Martínez, José Moisés Grimaldo-Galeana, Luz Eugenia Alcántara-Quintana, Fernando Díaz-Barriga, Francisco Javier Pérez-Vázquez, Rogelio Flores-Ramírez

Full Source: Environmental science and pollution research international 2022 Apr 9. doi: 10.1007/s11356-022-20101-8.

### PHARMACEUTICAL/TOXICOLOGY

#### Head and neck cancer and asbestos exposure

2022-04-07

**Objectives:** The aim of this study was to analyse, within a French cohort of workers previously occupationally exposed to asbestos, incidence and mortality from various sites of head and neck cancers (larynx excluded) and to examine the potential link of these cancers with pleural plaques. **Methods:** A 10-year follow-up study was conducted in the 13 481 male subjects included in the cohort between October 2003 and December 2005. Asbestos exposure was assessed by industrial hygienist analysis of a standardised questionnaire. The final cumulative exposure index (CEI; in equivalent fibres.years/mL) for each subject was calculated as the sum of each employment period's four-level CEI. The number of head and neck cancers recorded by the National Health Insurance fund was collected in order to conduct an incidence study. Complementary analysis was restricted to men who had performed at least one chest CT scan (N=4804). A mortality study was also conducted. We used a Cox model with age as the time axis variable adjusted for smoking, time since first exposure, CEI of exposure to asbestos and pleural plaques on CT scans. **Results:** We reported a significant dose-response relationship between CEI of exposure to asbestos and head and neck cancers after exclusion of laryngeal cancers, in the mortality study (HR 1.03, 95% CI (1.01 to 1.06) for an increase of 10 f.years/mL) and a close to significant dose-response relationship in the incidence study (HR 1.02, 95% CI (1.00 to 1.04) for an increase of 10 f.years/mL). No statistically significant association between pleural plaques and head and neck cancer incidence was observed. **Conclusions:** This large-scale study suggests a relationship between asbestos exposure and head and

#### Objectives:

The aim of this study was to analyse, within a French cohort of workers previously occupationally exposed to asbestos, incidence and mortality from various sites of head and neck cancers (larynx excluded) and to examine the potential link of these cancers with pleural plaques.

## Bulletin Board

## Technical

APR. 15, 2022

neck cancers, after exclusion of laryngeal cancers, regardless of whether associated pleural plaques were present.

Authors: Bénédicte Clin, Celine Gramond, Isabelle Thaon, Patrick Brochard, Fleur Delva, Soizick Chamings, Antoine Gislard, François Laurent, Christophe Paris, Aude Lacourt, Jean-Claude Pairon  
Full Source: Occupational and environmental medicine 2022 Apr 7; oemed-2021-108047. doi: 10.1136/oemed-2021-108047.

### Exploring the origin of efficient adsorption of poly- and perfluoroalkyl substances in household point-of-use water purifiers: Deep insights from a joint experimental and computational study

2022-04-02

Poly- and perfluoroalkyl substances (PFAS) are harmful chemicals to humans and widely detected in water bodies including tap water. PFAS cannot be efficiently removed from water through conventional treatment processes used in full-scale drinking water treatment plants, posing a latent risk to human health via drinking tap water. Here in-field investigations show that the household point-of-use (POU) water purifiers constituted with coconut shell activated carbon can achieve 21%-99% removal for 14 legacy and emerging PFAS in tap water based on the ratio of influent and effluent. Extensive characterizations combine with chemical analyses demonstrate that physical adsorption based on Van der Waals force can remove 23 PFAS from tap water, wherein the hydrophobicity of PFAS is the crucial factor. Density functional theory calculations together with the quantitative structure-activity relationship model confirm that both topological structures as well as hydrophobicity of PFAS and electrostatic interactions between the strong electronegative F atoms and the adsorbent surface are the most critical factors controlling the PFAS adsorption to activated carbon. Overall, our results offer insights into the molecular mechanisms that enable the adsorption of PFAS in POU filters.

Authors: Anen He, Yao Lu, Fengjie Chen, Feifei Li, Kun Lv, Huiming Cao, Yuzhen Sun, Yong Liang, Juan Li, Lixia Zhao, Xiang Zhang, Lingxiangyu Li, Yawei Wang, Guibin Jiang  
Full Source: The Science of the total environment 2022 Apr 2; 831:154988. doi: 10.1016/j.scitotenv.2022.154988.

Poly- and perfluoroalkyl substances (PFAS) are harmful chemicals to humans and widely detected in water bodies including tap water.

## Bulletin Board

## Technical

APR. 15, 2022

## OCCUPATIONAL

### Toxicopathological changes induced by combined exposure to noise and toluene in New Zealand White rabbits

2022-04-07

Noise and toluene can have significant adverse effects on different systems in the human body, but little is known about their combination. The aim of this study was to see how their combined action reflects on serum levels of inflammatory cytokines tumour necrosis factor alpha (TNF- $\alpha$ ) and interleukin 1 beta (IL-1 $\beta$ ), body weight, and pathological changes in the heart, lung, stomach, and spleen tissues. To do that we exposed New Zealand rabbits to 1000 mg/L toluene and 100 dB of white noise in a chamber specifically designed for the purpose over two consecutive weeks. Serum levels of TNF- $\alpha$  and IL-1 $\beta$  were measured with the enzyme-linked immunosorbent assay (ELISA), whereas Bax and Bcl-2 expressions in tissues were determined with real-time polymerase chain reaction (PCR). Noise and toluene changed TNF- $\alpha$  and IL-1 $\beta$  serum levels on different days following the end of exposure and significantly increased the Bax/Bcl-2 ratio in the lung and spleen. In addition, they induced different pathological changes in the heart, lung, spleen, and stomach tissues. This study has confirmed that exposure to noise and toluene can induce a range of toxicopathological changes, probably by inducing inflammatory pathways and apoptosis, but their combined effects look weaker than those of its components, although histopathological findings suggest the opposite.

Authors: Amirreza Abouee-Mehrizi, Yahya Rasoulzadeh, Tohid Kazemi, Ahmad Mehdipour, Mehran Mesgari-Abbasi  
Full Source: Arhiv za higijenu rada i toksikologiju 2022 Apr 7; 73(1):31-42. doi: 10.2478/aiht-2022-73-3602.

Noise and toluene can have significant adverse effects on different systems in the human body, but little is known about their combination.

### Assessing Exposures from the Deepwater Horizon Oil Spill Response and Clean-up

2022-04-07

The GuLF Study is investigating adverse health effects from work on the response and clean-up after the Deepwater Horizon explosion and oil release. An essential and necessary component of that study was the exposure assessment. Bayesian statistical methods and over 135 000 measurements of total hydrocarbons (THC), benzene, ethylbenzene, toluene, xylene, and n-hexane (BTEX-H) were used to estimate inhalation

## Bulletin Board

## Technical

APR. 15, 2022

exposures to these chemicals for >3400 exposure groups (EGs) formed from three exposure determinants: job/activity/task, location, and time period. Recognized deterministic models were used to estimate airborne exposures to particulate matter sized 2.5 µm or less (PM2.5) and dispersant aerosols and vapors. Dermal exposures were estimated for these same oil-related substances using a model modified especially for this study from a previously published model. Exposures to oil mist were assessed using professional judgment. Estimated daily THC arithmetic means (AMs) were in the low ppm range (<25 ppm), whereas BTEX-H exposures estimates were generally <1000 ppb. Potential 1-h PM2.5 air concentrations experienced by some workers may have been as high as 550 µg m<sup>-3</sup>. Dispersant aerosol air concentrations were very low (maximum predicted 1-h concentrations were generally <50 µg m<sup>-3</sup>), but vapor concentrations may have exceeded occupational exposure excursion guidelines for 2-butoxyethanol under certain circumstances. The daily AMs of dermal exposure estimates showed large contrasts among the study participants. The estimates are being used to evaluate exposure-response relationships in the GuLF Study.

Authors: Patricia Stewart, Caroline P Groth, Tran B Huynh, Melanie Gorman Ng, Gregory C Pratt, Susan F Arnold, Gurumurthy Ramachandran, Sudipto Banerjee, John W Cherrie, Kate Christenbury, Richard K Kwok, Aaron Blair, Lawrence S Engel, Dale P Sandler, Mark R Stenzel  
Full Source: *Annals of work exposures and health* 2022 Apr 7;66(Supplement\_1):i3-i22. doi: 10.1093/annweh/wxab107.

### Telomere fragility in radiology workers occupationally exposed to low doses of ionising radiation

2022-04-07

Ionising radiation damages DNA directly and indirectly through increased production of reactive oxygen species. Although telomeres have been reported as indicators of radiosensitivity, their maintenance in response to occupational exposure to low radiation doses is still a matter of debate. In this work we aimed to investigate telomere length and structure in hospital workers occupationally exposed to X-rays and to relate these findings to oxidation of biomolecules and chromosome aberrations. Blood samples of exposed participants and matching controls were taken during periodical check-ups. Chromosome aberrations and telomere length and structure were analysed in peripheral blood lymphocytes using Q-FISH, whereas oxidative stress parameters [pro/antioxidant balance (PAB), lipid peroxidation, and 8-oxo-dG] were measured in plasma samples. Based on the CA findings we divided the exposed group into two subgroups, of

Ionising radiation damages DNA directly and indirectly through increased production of reactive oxygen species.

## Bulletin Board

## Technical

APR. 15, 2022

which one had chromosome aberrations in the first division metaphases and the other did not. There was no significant difference in telomere length between any of the groups. However, both subgroups showed significantly higher rate of fragile telomeres and higher lipid peroxidation product and 8-oxo-dG levels than controls. The rate of fragile telomeres significantly correlated with plasma levels of 8-oxo-dG, which suggests that continuous exposure to low radiation doses induces oxidative base damage of guanine resulting in telomere fragility.

Authors: Jelena Filipović Tričković, Ana Valenta Šobot, Ivana Joksić, Gordana Joksić

Full Source: *Arhiv za higijenu rada i toksikologiju* 2022 Apr 7;73(1):23-30. doi: 10.2478/aiht-2022-73-3609.

### Obesity II: Establishing Causal Links Between Chemical Exposures and Obesity

2022-03-24

Obesity is a multifactorial disease with both genetic and environmental components. The prevailing view is that obesity results from an imbalance between energy intake and expenditure caused by overeating and insufficient exercise. We describe another environmental element that can alter the balance between energy intake and energy expenditure: obesogens. Obesogens are a subset of environmental chemicals that act as endocrine disruptors affecting metabolic endpoints. The obesogen hypothesis posits that exposure to endocrine disruptors and other chemicals can alter the development and function of the adipose tissue, liver, pancreas, gastrointestinal tract, and brain, thus changing the set point for control of metabolism. Obesogens can determine how much food is needed to maintain homeostasis and thereby increase the susceptibility to obesity. The most sensitive time for obesogen action is in utero and early childhood, in part via epigenetic programming that can be transmitted to future generations. This review explores the evidence supporting the obesogen hypothesis and highlights knowledge gaps that have prevented widespread acceptance as a contributor to the obesity pandemic. Critically, the obesogen hypothesis changes the narrative from curing obesity to preventing obesity.

Authors: Jerrold J Heindel, Sarah Howard, Keren Agay-Shay, Juan P Arrebola, Karine Audouze, Patrick J Babin, Robert Barouki, Amita Bansal, Etienne Blanc, Matthew C Cave, Saurabh Chatterjee, Nicolas Chevalier, Mahua Choudhury, David Collier, Lisa Connolly, Xavier Coumoul, Gabriella Garruti, Michael Gilbertson, Lori A Hoepner, Alison C Holloway, George Howell 3rd, Christopher Kassotis, Mathew K Kay, Min Ji Kim, Dominique

Obesity is a multifactorial disease with both genetic and environmental components.

# Bulletin Board

## Technical

APR. 15, 2022

Lagadic-Gossmann, Sophie Langouet, Antoine Legrand, Zhuorui Li, Helene Le Mentec, Lars Lind, P Monica Lind, Robert H Lustig, Corinne Martin-Chouly, Vesna Munic Kos, Normand Podechard, Troy A Roepke, Robert M Sargis, Anne Starling, Craig R Tomlinson, Charbel Touma, Jan Vondracek, Frederick Vom Saal, Bruce Blumberg  
Full Source: *Biochemical pharmacology* 2022 Mar 24;115015. doi: 10.1016/j.bcp.2022.115015.