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CHEMICAL EFFECTS

Bisphenol A replacement chemicals, BPF and BPS, induce protumorigenic changes in human mammary gland organoid morphology and proteome

2022-03-15

Significance Bisphenol A (BPA), found in many plastic products, has weak estrogenic effects that can be harmful to human health. Thus, structurally related replacements-bisphenol S (BPS) and bisphenol F (BPF)-are coming into wider use with very few data about their biological activities. Here, we compared the effects of BPA, BPS, and BPF on human mammary organoids established from normal breast tissue. BPS disrupted organoid architecture and induced supernumerary branching. At a proteomic level, the bisphenols altered the abundance of common targets and those that were unique to each compound. The latter included proteins linked to tumor-promoting processes. These data highlighted the importance of testing the human health effects of replacements that are structurally related to chemicals of concern.

Authors: Juliane Winkler, Pengyuan Liu, Kiet Phong, Johanna H Hinrichs, Nassim Ataii, Katherine Williams, Elin Hadler-Olsen, Susan Samson, Zev J Gartner, Susan Fisher, Zena Werb

Full Source: Proceedings of the National Academy of Sciences of the United States of America 2022 Mar 15;119(11):e2115308119. doi: 10.1073/pnas.2115308119.

Organic UV Filters Induce Toll-like-Receptors and Related Signaling Pathways in Peripheral Blood Mononuclear Cells of Juvenile Loggerhead Sea Turtles (*Caretta caretta*)

2022-02-27

Recent evidence suggests that exposure to organic ultraviolet filters (UV filters) is associated with dysregulated neuroendocrine-immune homeostasis. Marine species are likely to be among the most vulnerable to UV filters due to widespread diffusion of these chemicals in the aquatic environment. In the present study, the effects of UV filter bioaccumulation on toll-like-receptors (TLRs) and related signaling pathways were investigated in peripheral blood mononuclear cells (PBMCs) of juvenile loggerhead sea turtles (*Caretta caretta*). We found that the expression of both TLR1 and TLR2 was significantly increased in UV-filter exposed turtles compared to control animals. Similarly, the signaling pathway downstream of activated TLRs (i.e., Ras-related C3 botulinum toxin substrate 1 (RAC1),

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Phosphoinositide 3-kinase (PI3K), serine/threonine-protein kinase (AKT3), and nuclear factor κ B (NF- κ B)) was significantly up-regulated, leading to an enhanced transcription of pro-inflammatory cytokines. In addition, we demonstrated that high levels of plasma UV filters increased lipid peroxidation in sea turtles' PBMCs. Our results indicated that UV filters affected the inflammatory responses of PBMCs via modulation of the TLR/ NF- κ B signaling pathway and provided a new insight into the link between exposure to sunscreen agents and sea turtle health.

Authors: Paolo Cocci, Gilberto Mosconi, Francesco Alessandro Palermo

Full Source: Animals : an open access journal from MDPI 2022 Feb 27;12(5):594. doi: 10.3390/ani12050594.

The Association between ADHD and Environmental Chemicals-A Scoping Review

2022-03-01

The role of environmental chemicals in the etiology of attention deficit hyperactivity disorder (ADHD) has been of interest in recent research. This scoping review aims to summarize known or possible associations between ADHD and environmental exposures to substances selected as priority chemicals of the European Human Biomonitoring Initiative (HBM4EU). Literature searches were performed in PubMed to identify relevant publications. Only meta-analyses and review articles were included, as they provide more extensive evidence compared to individual studies. The collected evidence indicated that lead (Pb), phthalates and bisphenol A (BPA) are moderately to highly associated with ADHD. Limited evidence exists for an association between ADHD and polycyclic aromatic hydrocarbons (PAHs), flame retardants, mercury (Hg), and pesticides. The evidence of association between ADHD and cadmium (Cd) and per- and polyfluoroalkyl substances (PFASs) based on the identified reviews was low but justified further research. The methods of the individual studies included in the reviews and meta-analyses covered in the current paper varied considerably. Making precise conclusions in terms of the strength of evidence on association between certain chemicals and ADHD was not straightforward. More research is needed for stronger evidence of associations or the lack of an association between specific chemical exposures and ADHD.

Authors: Sonja Moore, Laura Paalanen, Lisa Melymuk, Andromachi Katsonouri, Marike Kolossa-Gehring, Hanna Tolonen

Full Source: International journal of environmental research and public health 2022 Mar 1;19(5):2849. doi: 10.3390/ijerph19052849.

The role of environmental chemicals in the etiology of attention deficit hyperactivity disorder (ADHD) has been of interest in recent research.

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ENVIRONMENTAL RESEARCH

Covid-19-derived plastic debris contaminating marine ecosystem: Alert from a sea turtle

2022-02

On 10 August 2021, a face mask (14 cm × 9 cm) was found in the feces of a juvenile green turtle, by-caught alive in a set net off the northeast coast of Japan. Although sea turtles have been monitored in this region over the last 15 years (n = 76), face masks had never been found before the Covid-19 pandemic and this is the first detection. Fourier-transform infrared spectroscopy identified the mask as polypropylene. Estrogenic active benzotriazole-type UV stabilizers such as UV329 were detected in commercially available polypropylene face masks. Exposure of marine organisms ingesting plastics to endocrine-disrupting chemicals and physical injury are of concern. This study indicates that changes in human life in the pandemic are beginning to affect marine life. Precautionary actions including establishment of appropriate waste management of personal protective equipment and use of safe additives are urgently needed.

Authors: Takuya Fukuoka, Fumiki Sakane, Chihiro Kinoshita, Katsufumi Sato, Kaoruko Mizukawa, Hideshige Takada

Full Source: Marine pollution bulletin 2022 Feb;175:113389. doi: 10.1016/j.marpolbul.2022.113389.

Potential trade-off between water consumption and water quality: life cycle assessment of nonaqueous solvent dyeing

2022-02-25

Fashion industry consumes over 60% of global fibers and attracts increasing attentions due to its environmentally polluting supply chain. In addition to natural fibers cultivation, wet processes of textile manufacturing are also important contributors to water-related impacts due to their large freshwater consumption and the production of chemicals containing wastewater. Despite of efforts made in improving efficiency of water use and wastewater treatment in textile industry, innovative 'water-free' technologies, such as nonaqueous dyeing technology using organic solvent, have been developed and demonstrated to reduce water consumption significantly. However, the potential impact on water quality by organic solvents induced in supply chain of this emerging technology remains unassessed, posing an unknown risk of its promotion. Hence, in the present study,

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a comprehensive life cycle assessment is applied to evaluate its full environmental impacts, including those on ecosystem and human health caused by decamethylcyclopentasiloxane (D5) as the solvent used. Further, the nonaqueous dyeing system is compared with traditional aqueous dyeing technology from both environmental and economic perspectives. Results indicate that nonaqueous dyeing system is advanced in most of environment categories except for abiotic depletion potential (ADP) and Ecotoxicity. However, scenarios analysis reveal that these findings are influenced by the loss fraction of D5 during the solvent recovery process. It is suggested that the loss fraction should be controlled below 2% o.w.f. for the nonaqueous dyeing technology to be advanced throughout all environmental categories. Nonaqueous D5 dyeing could reduce water consumption by 61.30%-79.95% and greenhouse gas emissions by 43.70% compared to the traditional system, delivering a promising contribution to China's 2060 carbon neutrality ambition. Sensitivity and uncertainty analyses are also conducted to investigate the effects of the key parameters (incl. inventory data and USEtox model inputs) and demonstrate the robustness of our assessment.

Authors: Yi Zhang, Shengcai Guo, Yan Gong, Lei Wang

Full Source: Water research 2022 Feb 25;215:118222. doi: 10.1016/j.watres.2022.118222.

PHARMACEUTICAL/TOXICOLOGY

A high-throughput assay for screening the abilities of per- and polyfluoroalkyl substances in inducing plasma kallikrein-like activity

2022-03-04

The plasma consists of multiple functional serine zymogens, such as plasma kallikrein-kinin system (KKS), which are vulnerable to exogenous chemical exposure, and may closely relate to the deleterious effects. Testing whether the anthropogenic chemicals could increase the kallikrein-like activity in plasma or not would be of great help to understand their potentials in triggering the cascade activation of the plasma zymogens and explain the corresponding hematotoxicity. In this study, a novel high-throughput ex vivo assay was established to screen the abilities of emerging chemicals like per- and polyfluoroalkyl substances (PFASs) in inducing kallikrein-like activities on basis of using rat plasma as the protease zymogen source. Upon the optimization of the conditions in the test system, the assay gave sensitive fluorescent response to the

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stimulation of the positive control, dextran sulfate, and the dose-response showed a typical S-shaped curve with EC50 of 0.24 mg/L. The intra-plate and inter-plate relative standard deviations (RSDs) were less than 10% in the quantitative range of dextran sulfate, indicating a good reliability and repeatability of this newly-established assay. Using this method, several alternatives or congeners of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), including 6:2 chlorinated polyfluoroalkyl ether sulfonate (6:2 Cl-PFESA), Ag-PFOA, K-PFOA, Na-PFOA and ammonium pentadecafluorooctanoate (APFO), were further screened, and their capabilities in inducing kallikrein-like activities were identified. The ex vivo assay newly-developed in the present study would be promising in high-throughput screening of the hematological effects of emerging chemicals of concern.

Authors: Qian S Liu, Yuzhu Zhang, Zhendong Sun, Yurou Gao, Qunfang Zhou, Guibin Jiang

Full Source: Ecotoxicology and environmental safety 2022 Mar 4;234:113381. doi: 10.1016/j.ecoenv.2022.113381.

Exposure to phthalates and female reproductive health: a literature review

2022-03-03

Endocrine-disrupting chemicals (EDCs) are exogenous compounds that have been known for their ability to interfere with the action of hormones and affect endocrine pathways, including the ones involved in the development and function of both male and female reproductive systems. EDCs comprise a wide class of compounds, such as pesticides, bisphenol A, phthalates and, parabens, that are present in the environment and in several daily use products. Phthalate esters, compounds commonly used as plasticizers and additives in many industrial applications, have attracted special attention because of the widespread human exposure and the potential for disruption of androgen-dependent development in males. Although phthalates are rapidly metabolized and excreted, their ubiquitous presence ensures continuous exposures throughout different life stages from conception to adult life, as documented by a number of human biomonitoring studies worldwide. Although most research efforts have been placed on the impact of phthalates on male reproductive development and functions, there is a large body of recent experimental and observational data indicating that phthalates can negatively affect female reproductive health, and in particular alter ovarian and uterine functions, potentially contributing to disorders like polycystic ovarian syndrome, endometriosis, and other common female reproductive

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problems. This review summarizes the most recent experimental and epidemiologic literature on the potential effects of phthalate exposures on female reproductive health and their impact on female fertility.

Authors: Carla Giovana Basso, Anderson Tadeu de Araujo-Ramos, Anderson Joel Martino-Andrade

Full Source: Reproductive toxicology (Elmsford, N.Y.) 2022 Mar 3;S0890-6238(22)00026-0. doi: 10.1016/j.reprotox.2022.02.006.

OCCUPATIONAL

The Escalating Crisis of Health and Safety Law Enforcement in Great Britain: What Does Brexit Mean?

2022-03-07

This paper explores occupational safety and health regulation in Great Britain following the UK's exit from the European Union. In particular, the paper focuses on the credibility of regulatory enforcement. The prospects raised by the UK's exit from the European Union have long been part of a free-market fantasy-even obsession-of right-wing politicians and their ideologues. As the UK's relationship with the EU is recalibrated, this will present right-wing opportunists with a new rationale for undermining health and safety law and enforcement. The paper uses empirical evidence of Great Britain's record in health and safety law enforcement to evidence a drift towards an extreme form of self-regulation. It deepens this evidence with a detailed analysis of key international policy debates, arguing that Brexit now raises an imminent threat of the UK entering a 'race to the bottom'. The paper concludes that the 2021 EU/UK Trade and Co-operation Agreement may enable the UK to evade its formal health and safety responsibilities under the treaty because of the lack of the prospect of significant retaliatory 'rebalancing' measures. Should minimal health and safety requirements cease to apply in the post-EU era, then the UK Government will be free to pursue a system of self-regulation that will allow health and safety standards to fall even further behind those of other developed economies.

Authors: Andrew Moretta, Steve Tombs, David Whyte

Full Source: International journal of environmental research and public health 2022 Mar 7;19(5):3134. doi: 10.3390/ijerph19053134.

This paper explores occupational safety and health regulation in Great Britain following the UK's exit from the European Union.

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Job Exposure Matrix for Chrysotile Asbestos Fibre in the Asbestos Cement Manufacturing (ACM) Industry in Zimbabwe

2022-02-25

Occupational chrysotile asbestos exposure data in Zimbabwe is limited. The aim of this study was therefore to develop a job exposure matrix (JEM) specific to the chrysotile asbestos cement manufacturing industry using the available personal exposure concentration data. Quantitative personal exposure chrysotile fibre concentration data collected by the two factories from 1996 to 2020 were used to construct the JEM. Exposure groups from which data was extracted were classified based on the Zimbabwe Standard Classification of Occupations (ZSCO), 2009-2019. Analysis of amphiboles in raw chrysotile was done by scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS). Descriptive statistics, namely mean, standard deviation and range were computed for the main variable, job/occupation. All jobs/occupations in both factories had annual mean personal exposure concentrations exceeding the OEL of 0.1 f/mL, except for the period from 2009 to 2016 in the Harare factory and the period from 2009 to 2020 in the Bulawayo factory. Despite the Harare factory having no AC manufacturing activity since 2017, personal exposure concentrations showed elevated levels for the period 2018-2020. Amphiboles were detected in almost all bulk samples of chrysotile asbestos analysed. The established JEM, which has been generated from actual local quantitative exposure measurements, can be used in evaluating historical exposure to chrysotile asbestos fibre, to better understand and predict occurrence of ARDs in future.

Authors: Benjamin Mutetwa, Dingani Moyo, Derk Brouwer

Full Source: International journal of environmental research and public health 2022 Feb 25;19(5):2680. doi: 10.3390/ijerph19052680.

Occupational External Exposure to Ionizing Radiation in Research-Associated Activities in Iran (2015-2020)

2022-03-10

Research is the integral part of radiological and nuclear activities; thus, workers may receive different levels of occupational exposure. In the present study, occupational external exposure of workers was studied at the largest radiological and nuclear research institute of Iran over 2015 to 2020. The activities included research reactors, nuclear fuel cycle, development on radiopharmaceuticals and radioisotopes, particle accelerators, plasma and fusion, and nuclear agriculture. The average

Occupational chrysotile asbestos exposure data in Zimbabwe is limited.

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doses of the monitored and exposed workers were calculated to be 0.095 and 0.575 mSv, respectively, which were around their corresponding worldwide values. Moreover, the results showed that in comparison with other research activities, the workers in research reactors, nuclear fuel cycle, and development of radiopharmaceuticals and radioisotopes may face higher occupational risks. It could be therefore concluded that all the radiation protection measures have been effective to achieve safe research activities in Iran.

Authors: Seyed Mahdi Hosseini Pooya, Mirshahram Hosseinipanah

Full Source: Journal of radiological protection : official journal of the Society for Radiological Protection 2022 Mar 10. doi: 10.1088/1361-6498/ac5c7c.