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CHEMICAL EFFECTS

Endocrine disruptor chemicals. A review of their effects on male reproduction and antioxidants as a strategy to counter it

2021-11-11

Endocrine disruptor chemicals are exogenous molecules that generate adverse effects on human health by destabilizing the homeostasis of endocrine system and affecting directly human reproductive system by inhibiting or activating oestrogenic or androgenic receptors. Endocrine disruptor chemicals generate transgenerational epigenetic problems, besides being associated with male infertility. Epidemiological data indicate that the increase in reproductive problems in males in the last 50 years is correlated with the increase of endocrine disrupting chemicals in the environment, being associated with a decrease in semen quality and direct effects on spermatozoa, such as alterations in motility, viability and acrosomal reaction, due to the generation of oxidative stress, and have also been postulated as a possible cause of testicular dysgenesis syndrome. Diverse antioxidants, such as C and E vitamins, N-acetylcysteine, selenium and natural vegetable extracts, are among the alternatives under study to counter the effects of endocrine disruptor chemicals. In some cases, the usage of them has given positive results and the opposite in others. In this review, we summarize the recent information about the effects of endocrine disruptor chemicals on male reproduction, on sperm cells, and the results of studies that have tested antioxidants as a strategy to diminish their harmful effects.

Authors: Nelson Quilaqueo, Juana V Villegas

Full Source: *Andrologia* 2021 Nov 11;e14302. doi: 10.1111/and.14302.**Chemicals of concern in building materials: A high-throughput screening**

2021-10-23

Chemicals used in building materials can be a major passive emission source indoors, associated with the deterioration of indoor environmental quality. This study aims to screen the various chemicals used in building materials for potential near-field human exposures and related health risks, identifying chemicals and products of concern to inform risk reduction efforts. We propose a mass balance-based and high-throughput suited model for predicting chemical emissions from building materials considering indoor sorption. Using this model, we

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performed a screening-level human exposure assessment for chemicals in building materials, starting from product chemical composition data reported in the Pharos Building Products Database for the USA. Health risks and MAXimum chemical Contents from High-Throughput Screening (MACHTS) were determined, combining exposure estimates with toxicity information. Exposures were estimated for > 300 unique chemical-product combinations from the Pharos databases, of which 73% (25%) had non-cancer (cancer) toxicity data available. We identified 55 substances as chemicals of high concern, with actual chemical contents exceeding MACHTS by up to a factor 105, in particular diisocyanates and formaldehyde. This stresses the need for more refined investigations to select safer alternatives. This study serves as a suitable starting point for prioritizing chemicals/products and thus developing safer and more sustainable building materials.

Authors: Lei Huang, Peter Fantke, Amélie Ritscher, Olivier Jolliet

Full Source: *Journal of hazardous materials* 2021 Oct 23;127574. doi: 10.1016/j.jhazmat.2021.127574.**[Endocrine Disruptors: what are we talking about and what new mechanisms of toxicity do they bring into play?]**

2021-09

WHAT ARE WE TALKING ABOUT AND WHAT NEW MECHANISMS OF TOXICITY DO THEY BRING INTO PLAY? Endocrine disruptors (EDs) are chemicals that can interfere with the functioning of the endocrine system and thereby cause an adverse event. They are suspected of being toxic to the environment and to humans and to increase the risk of developing pathologies such as cancer, metabolic, neurological or immune diseases. These substances are defined by their mechanisms of action which are now described as "Adverse Outcome Pathways" or AOPs. AOPs correspond to a logical chain of events leading to an adverse effect. EDs have properties which have modified our concepts in toxicology, in particular due to the low-dose effects of certain EDs, the possible effects of ED mixtures and finally their delayed effects over time, sometimes with years or decades that separate exposure and impact. Epigenetic mechanisms probably explain these delayed effects.

Authors: Robert Barouki, Karine Audouze, Xavier Coumoul

Full Source: *La Revue du praticien* 2021 Sep;71(7):723-726.

WHAT ARE WE TALKING ABOUT AND WHAT NEW MECHANISMS OF TOXICITY DO THEY BRING INTO PLAY? Endocrine disruptors (EDs) are chemicals that can interfere with the functioning of the endocrine system and thereby cause an adverse event.

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Spatial Variations of Indoor Air Chemicals in an Apartment Unit and Personal Exposure of Residents

2021-11-01

Indoor air quality (IAQ) can greatly affect health in people spending much time indoors. However, the influence of IAQ on personal exposure to chemical compounds in Japan remains poorly investigated. Hence, this study aimed to clarify this influence thoroughly within one apartment. We surveyed the concentrations of 61 chemical compounds in the air in nine different spaces within an apartment unit, as well as the personal exposure of two residents in Japan. Using three kinds of diffusive samplers, this study was conducted continuously for 7 days in summer and winter. Health risks were evaluated by calculating the margin of exposure (MOE) using the measured concentrations. Some chemical concentrations showed large spatial variations and the personal exposure concentrations of these compounds also differed among residents. According to the calculated MOE, the chemicals with the highest health risk were acrolein, p-dichlorobenzene, and acetaldehyde in summer and acrolein, nitrogen dioxide, formic acid, p-dichlorobenzene, and benzene in winter. The IAQ of the house could be divided in two, and the IAQ in the space where residents spent much time (i.e., bedroom) highly affected each of the residents' exposure. Investigating chemical concentrations in multiple spaces (including bedroom and living room) is necessary to understand the effect of IAQ on personal exposure.

Authors: Hironari Sakamoto, Shigehisa Uchiyama, Tomohiko Isobe, Naoki Kunugita, Hironao Ogura, Shoji F Nakayama

Full Source: International journal of environmental research and public health 2021 Nov 1;18(21):11511. doi: 10.3390/ijerph182111511.

Indoor air quality (IAQ) can greatly affect health in people spending much time indoors.

ENVIRONMENTAL RESEARCH

Combined effects of heatwaves and micropollutants on freshwater ecosystems: Towards an integrated assessment of extreme events in multiple stressors research

2021-11-04

Freshwater ecosystems are strongly influenced by weather extremes such as heatwaves (HWs), which are predicted to increase in frequency and magnitude in the future. In addition to these climate extremes, the freshwater realm is impacted by the exposure to various classes of chemicals emitted by anthropogenic activities. Currently, there is limited knowledge on how the combined exposure to HWs and chemicals affects

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the structure and functioning of freshwater ecosystems. Here, we review the available literature describing the single and combined effects of HWs and chemicals on different levels of biological organization, to obtain a holistic view of their potential interactive effects. We only found a few studies (13 out of the 61 studies included in this review) that investigated the biological effects of HWs in combination with chemical pollution. The reported interactive effects of HWs and chemicals varied largely not only within the different trophic levels but also depending on the studied endpoints for populations or individuals. Hence, owing also to the little number of studies available, no consistent interactive effects could be highlighted at any level of biological organization. Moreover, we found an imbalance towards single species and population experiments, with only five studies using a multitrophic approach. This results in a knowledge gap for relevant community and ecosystem level endpoints, which prevents the exploration of important indirect effects that can compromise food web stability. Moreover, this knowledge gap impairs the validity of chemical risk assessments and our ability to protect ecosystems. Finally, we highlight the urgency of integrating extreme events into multiple stressors studies and provide specific recommendations to guide further experimental research in this regard.

Authors: Francesco Polazzo, Sabrina K Roth, Markus Hermann, Annika Mangold-Döring, Andreu Rico, Anna Sobek, Paul J Van den Brink, Michelle C Jackson

Full Source: Global change biology 2021 Nov 4. doi: 10.1111/gcb.15971.

Environmental factors, medical and family history, and comorbidities associated with primary biliary cholangitis in Japan: a multicenter case-control study

2021-11-18

Background: Primary biliary cholangitis (PBC) is considered to be caused by the interaction between genetic background and environmental triggers. Previous case-control studies have indicated the associations of environmental factors (tobacco smoking, a history of urinary tract infection, and hair dye) use with PBC. Therefore, we conducted a multicenter case-control study to identify the environmental factors associated with the development of PBC in Japan.

Methods: From 21 participating centers in Japan, we prospectively enrolled 548 patients with PBC (male/female = 78/470, median age 66), and 548 age- and sex-matched controls. These participants completed a questionnaire comprising 121 items with respect to demographic, anthropometric, socioeconomic features, lifestyle, medical/familial history,

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and reproductive history in female individuals. The association was determined using conditional multivariate logistic regression analysis. Results: The identified factors were vault toilet at home in childhood [odds ratio (OR), 1.63; 95% confidence interval (CI), 1.01-2.62], unpaved roads around the house in childhood (OR, 1.43; 95% CI, 1.07-1.92), ever smoking (OR, 1.70; 95% CI, 1.28-2.25), and hair dye use (OR, 1.57; 95% CI, 1.15-2.14) in the model for lifestyle factors, and a history of any type of autoimmune disease (OR, 8.74; 95% CI, 3.99-19.13), a history of Cesarean section (OR, 0.20; 95% CI, 0.077-0.53), and presence of PBC in first-degree relatives (OR, 21.1; 95% CI, 6.52-68.0) in the model for medical and familial factors. Conclusions: These results suggest that poor environmental hygiene in childhood (vault toilets and unpaved roads) and chronic exposure to chemicals (smoking and hair dye use) are likely to be risk factors for the development of PBC in Japan.

Authors: Kosuke Matsumoto, Satoko Ohfuji, Masanori Abe, Atsumasa Komori, Atsushi Takahashi, Hideki Fujii, Kazuhito Kawata, Hidenao Noritake, Tomoko Tadokoro, Akira Honda, Maiko Asami, Tadashi Namisaki, Masayuki Ueno, Ken Sato, Keisuke Kakisaka, Mie Arakawa, Takanori Ito, Kazunari Tanaka, Takeshi Matsui, Toru Setsu, Masaaki Takamura, Satoshi Yasuda, Tomohiro Katsumi, Jun Itakura, Tomoya Sano, Yamato Tamura, Ryo Miura, Toshihiko Arizumi, Yoshinari Asaoka, Kiyoko Uno, Ai Nishitani, Yoshiyuki Ueno, Shuji Terai, Yasuhiro Takikawa, Youichi Morimoto, Hitoshi Yoshiji, Satoshi Mochida, Tadashi Ikegami, Tsutomu Masaki, Norifumi Kawada, Hiromasa Ohira, Atsushi Tanaka
Full Source: Journal of gastroenterology 2021 Nov 18. doi: 10.1007/s00535-021-01836-6.

OCCUPATIONAL

Decreased annual risk of tuberculosis infection in South Korean healthcare workers using interferon-gamma release assay between 1986 and 2005

2021-11-16

Background: Tuberculosis (TB) has been a major public health problem in South Korea. Although TB notification rate in Korea is gradually decreasing, still highest among the member countries of the Organization for Economic Cooperation and Development. To effectively control TB, understanding the TB epidemiology such as prevalence of latent tuberculosis infection (LTBI) and annual risk of TB infection (ARI) are important. This study aimed to identify the prevalence of LTBI and

Background: Tuberculosis (TB) has been a major public health problem in South Korea.

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ARI among South Korean health care workers (HCWs) based on their interferon-gamma release assays (IGRA).

Methods: This was single center, cross-sectional retrospective study in a tertiary hospital in South Korea. We performed IGRA in HCWs between May 2017 and March 2018. We estimated ARI based on IGRA results. Logistic regression model was used to identify factors affecting IGRA positivity.

Results: A total of 3233 HCWs were analyzed. Median age of participants was 38.0 and female was predominant (72.6%). Overall positive rate of IGRA was 24.1% and IGRA positive rates age-group wise were 6.6%, 14.4%, 34.3%, and around 50% in the age groups 20s, 30s, 40s, and 50s and 60s, respectively. The ARIs was 0.26-1.35% between 1986 and 2005; rate of TB infection has gradually decreased in the last two decades. Multivariable analysis indicated that older age, healed TB lesion in x-ray, and male gender were risk factors for IGRA positivity, whereas working in high-risk TB departments was not.

Conclusions: Results showed that ARI in South Korean HCWs gradually decreased over two decades, although LTBI remained prevalent. Our results suggest that the LTBI test result of HCWs might be greatly affected by age, rather than occupational exposure, in intermediate TB burden countries. Thus, careful interpretation considering the age structure is required.

Authors: Eun Hye Lee, Nak-Hoon Son, Se Hyun Kwak, Ji Soo Choi, Min Chul Kim, Chang Hwan Seol, Sung-Ryeol Kim, Byung Hoon Park, Young Ae Kang
Full Source: BMC infectious diseases 2021 Nov 16;21(1):1161. doi: 10.1186/s12879-021-06855-5.

Accelerated apoptosis, oxidative stress, and cholinergic inflammation in blood of metalworkers

2021-11-18

Metalworkers are exposed to numerous chemicals in their workplace environment, such as solvents, heavy metals, and metalworking fluids, that have a negative impact on their health. Furthermore, there is an increase in the prevalence of chronic diseases among metalworkers; however, the molecular mechanisms involved in this increased predisposition to chronic diseases are unclear. Considering that occupational exposure represents a potential risk for metalworkers, the aim of this study was to measure biomarkers of oxidative stress, inflammation, and cytotoxicity in the peripheral blood of metalworkers from Southern Brazil. The study included 40 metalworkers and 20 individuals who did not perform activities with any recognized exposure to chemical substances, such as those working

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in administration, commerce, and education, as controls. Cellular and molecular biomarkers as leukocyte viability, intracellular production of reactive species, mitochondrial mass and membrane potential and plasma lipid peroxidation, sulfhydryl groups, total antioxidant capacity, and butyrylcholinesterase activity were evaluated in the blood of metalworkers and controls. Metalworkers were found to have higher rates of apoptosis, increased production of reactive species, and increased mitochondrial potential and mass in leukocytes associated with decreased antioxidant defenses and increased activity of the butyrylcholinesterase enzyme in their plasma. It can be concluded that cytotoxicity, oxidative stress, and inflammation are involved in the multiplicity of health outcomes related to chemical exposure in the metalworking industry.

Authors: Gabriela Bonfanti-Azzolin, Camila P Capelleti, Kelly S Rodrigues, Suellen Da R Abdallah, Ana P Frielink, Giovana Ruppenthal, Bianca B Kuhn, Roberta Cattaneo, Patricia Wolkmer, Josiane W Bortolotto, Mariana M Parisi
Full Source: Toxicology and industrial health 2021 Nov 18;7482337211053164. doi: 10.1177/07482337211053164.

[Living and working conditions and access to health services for agricultural and non-agricultural workers, Brazil, 2013]

2021-11-15

In Brazil, the growth of agribusiness to the detriment of family agriculture occurred while concealing social, environmental and human health damages. The objective was to compare living and working conditions and access to health services between agricultural and non-agricultural workers. Data from the National Health Survey (PNS) on living and working conditions, sociodemographic, economic characteristics, and access to health services from a representative sample of the employed Brazilian population were adopted. Pearson's chi-square test was used, with a significance level of 0.05, taking the complex sampling design into consideration. Agricultural workers suffered from worse living conditions, lower purchasing power, greater exposure to solar radiation and chemical agents, and a higher frequency and severity of occupational accidents compared to non-agricultural workers. The agricultural population had greater coverage of the Family Health Service and sought medical care from the Unified Health System (SUS) to treat diseases, while the non-agricultural workers sought private medical care for preventive actions.

In Brazil, the growth of agribusiness to the detriment of family agriculture occurred while concealing social, environmental and human health damages.

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The differences found between these workers imply different patterns of illness and define specific health needs.

Authors: Fernanda de Albuquerque Melo Nogueira, Celia Szwarcwald Landmann, Giseli Nogueira Damacena

Full Source: Ciencia & saude coletiva 2021 Nov 15;26(suppl 3):5187-5200. doi: 10.1590/1413-812320212611.3.21312019.

PHARMACEUTICAL/TOXICOLOGY

Urinary levels of phthalate, bisphenol, and paraben and allergic outcomes in children: Korean National Environmental Health Survey 2015-2017

2021-11-16

Background: Phthalates, bisphenols and parabens have been widely used in household and personal-care products. Their endocrine disrupting, sensitizing and antimicrobial properties might play a role in the occurrence of allergic diseases. However, the effects of these chemicals, particularly on humans, are relatively underexplored.

Objectives: This study aimed to report the concentrations of phthalate, bisphenol and paraben in urine of Korean children, and assess their relationship with allergic outcomes.

Methods: Data obtained from nationally representative Korean children, a total of 1458 children between 3 and 11 years of age recruited in the Korean National Environmental Health Survey (3 rd round of KoNEHS 2015-2017), were analyzed. Associations of urinary phthalate metabolites, bisphenols, and parabens levels with atopic dermatitis and allergic rhinitis was examined by grouped into preschool (aged 3-5 years) and school children (aged 6-11 years). Allergic outcomes were obtained through questionnaires answered by their caregivers.

Results: Atopic dermatitis was associated with urinary metabolites of DEHP, BzBP, DINP, and DIDP, and MeP and PrP in preschool children, BPA and PrP in school children. Allergic rhinitis was associated with MeP and PrP in preschool children, and metabolites of DEHP, MeP and PrP in school children. The association of urinary chemicals with atopic dermatitis and allergic rhinitis were different by gender, especially in preschool children.

Conclusion: Urinary phthalates, BPA and parabens levels in the Korean children were related with atopic dermatitis and allergic rhinitis. Considering the importance of allergic diseases in children, the public health implications of exposure to these chemicals warrant further studies.

Background: Phthalates, bisphenols and parabens have been widely used in household and personal-care products.

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Given the cross-sectional design and confounding variables, the results of this study should be interpreted with caution.

Authors: Moonyoung Hwang, Kyungho Choi, Choonghee Park

Full Source: The Science of the total environment 2021 Nov 16;151703. doi: 10.1016/j.scitotenv.2021.151703.