

## Contents

CHEMWATCH

(click on page numbers for links)

### ENVIRONMENTAL RESEARCH

Behavioural profile alterations in zebrafish larvae exposed to environmentally relevant concentrations of eight priority pharmaceuticals .....	3
Occurrence and spatial distribution of phthalate esters in sediments of the Bohai and Yellow seas .....	3
Species turnover reveals hidden effects of decreasing nitrogen deposition in mountain hay meadows .....	4
Application of essential oils as a natural and alternate method for inhibiting and inducing the sprouting of potato tubers .....	5
A comparison of transgenic rodent mutation and in vivo comet assay responses for 91 chemicals .....	6

### MEDICAL RESEARCH

In vitro evaluation of organic extractable matter from ambient PM2.5 using human bronchial epithelial BEAS-2B cells: Cytotoxicity, oxidative stress, pro-inflammatory response, genotoxicity, and cell cycle deregulation .....	7
The impact of a quality improvement project to standardize pain, agitation, and withdrawal assessments on the use of morphine and midazolam in the Paediatric Intensive Care Unit.....	8
Optical, electrochemical and catalytic methods for in-vitro diagnosis using carbonaceous nanoparticles: a review.....	9
Quality of INR control and switching to non-Vitamin K oral anticoagulants between women and men with atrial fibrillation treated with Vitamin K Antagonists in Spain. A population-based, real-world study .....	10
Effects of intravenous oxycodone alone or in combination with naltrexone on measures of respiratory depression: a randomised placebo-controlled study.....	11

### OCCUPATIONAL RESEARCH

Probabilistic risk assessment of occupational exposure to volatile organic compounds in the rendering plant of a poultry slaughterhouse..	12
Innovations in Worksite Diagnosis of Urinary Tract Infections and the Occupational Health Nurse.....	12
Urinary trimethyl tin reflects blood trimethyl tin in workers recycling organotins .....	13

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## Contents

CHEMWATCH

The quantitative and qualitative parameters of rhythytocograms in methanol and formaldehyde impact in production environment.....14

Health Risks of Polybrominated Diphenyl Ethers (PBDEs) and Metals at Informal Electronic Waste Recycling Sites.....14

### PUBLIC HEALTH RESEARCH

Lactational exposure to phthalates impaired the neurodevelopmental function of infants at 9 months in a pilot prospective study.....15

Mercury levels in blood, urine and hair in a nation-wide sample of Spanish adults .....16

Potential Health Risks of Chemicals in Car Colorant Products.....17

Changing prevalence of current asthma and inhaled corticosteroid treatment in the UK: population-based cohort 2006-2016 .....17

Assessment of human oestrogen receptor agonistic/antagonistic effects of veterinary drugs used for livestock and farmed fish by OECD in vitro stably transfected transcriptional activation assays.....18

### ENVIRONMENTAL RESEARCH

#### Behavioural profile alterations in zebrafish larvae exposed to environmentally relevant concentrations of eight priority pharmaceuticals

2019-04-23

Although the effects of pharmaceuticals on aquatic organisms have been widely investigated during the last decades, toxic effects, especially delayed toxicity, during the developmental stage at environmental relevant concentrations were rarely known. In this study, a sensitive assay based on behavioural alterations was used for studying the delayed toxicity during the developmental stage on zebrafish embryos. Eight pharmaceuticals that were frequently detected with concentrations ranging from ng/l to µg/l were screened for this study. Behavioural alterations of zebrafish at 118 hpf (hours post fertilisation) after exposing to eight single pharmaceuticals with concentrations in the ranges of environmental detected and their mixtures during embryonic development (2-50 h post fertilisation, hpf) were observed. Multiple endpoints, including mortality, hatching rate, swimming speed and angular velocity were evaluated. Results showed that behavioural profile alterations in zebrafish larvae are promising for predicting delayed sublethal effects of chemicals. Delayed hatch was observed at 72 hpf following embryonic exposure to triclosan (1 µg/l) and carbamazepine (100 µg/l) up to 50 hpf. The zebrafish larval locomotor behaviour following embryonic exposure to 0.1 µg/l triclosan and 1 µg/l caffeine in the early stages of development (2-50 hpf) was altered. Furthermore, the effects of the mixture of 8 pharmaceuticals each with the highest environmental concentration on larval behaviour were observed during embryonic development. Generally, this study showed that the effects of pharmaceuticals singly or their mixtures in surface waters cannot be ignored.

Zhou S, Chen Q, Di Paolo C, Shao Y, Hollert H, Seiler TB.

Full Source: Science of the Total Environment. 2019 May 10; 664:89-98. doi: 10.1016/j.scitotenv.2019.01.300. Epub 2019 Jan 24.

#### Occurrence and spatial distribution of phthalate esters in sediments of the Bohai and Yellow seas

2019-04-23

Phthalate esters (PEs) are a class of synthetic chemicals that have been widely used as plasticisers in industrial products and households. The

In this study, a sensitive assay based on behavioural alterations was used for studying the delayed toxicity during the developmental stage on zebrafish embryos.

## Technical

CHEMWATCH

occurrence of PEs in the marine environment has been a concern for many years because of their adverse impacts on marine organisms and human health. In this study, six major PEs, i.e. diethyl phthalate (DEP), di-isobutyl phthalate (DiBP), di-n-butyl phthalate (DnBP), benzylbutyl phthalate (BBP), dicyclohexyl phthalate (DCHP) and di-(2-ethylhexyl) phthalate (DEHP), were analysed in sediment samples collected in the Bohai and Yellow seas. The sum concentrations of the six PEs ranged from 1.4 to 24.6 ng/g and the average was 9.1 ng/g. The highest concentrations of PEs in the sediment samples were those of DEHP with a median concentration of 3.77 ng/g, followed by DiBP (median, 1.60 ng/g), DnBP (0.91 ng/g), DEP (0.32 ng/g), BBP (0.03 ng/g) and DCHP (0.01 ng/g). Generally, concentrations of PEs in the Bohai Sea are higher than those in the Yellow Sea. The varying spatial distributions of the individual PEs can be the result of discharge sources, regional ocean circulation patterns, and mud areas in the Bohai and Yellow seas. Significant positive correlations were found between total organic carbon content and the concentrations of DiBP, DnBP, and DEHP. It is estimated that the inventories of the  $\Sigma$ 6PEs were 20.73 tons in the Bohai Sea and 65.87 tons in the Yellow Sea. Both riverine discharge and atmospheric deposition are major input sources for the PE sedimentation, while massive plastic litter and microplastics sinking to the ocean floor can directly release PEs into sediment. This study provides an appropriate data set for the assessment of the risk of PEs to the marine ecosystem.

Authors: Mi L, Xie Z, Zhao Z, Zhong M, Mi W, Ebinghaus R, Tang J.  
Full Source: Science of the Total Environment. 2019 Feb 25; 653:792-800.  
doi: 10.1016/j.scitotenv.2018.10.438. Epub 2018 Nov 3.

### Species turnover reveals hidden effects of decreasing nitrogen deposition in mountain hay meadows

2019-04-23

Nitrogen (N) deposition is a major threat to biodiversity in many habitats. The recent introduction of cleaner technologies in Switzerland has led to a reduction in the emissions of nitrogen oxides, with a consequent decrease in N deposition. In this study, the authors examined different drivers of plant community change, that is, N deposition, climate warming, and land-use change, in Swiss mountain hay meadows, using data from the Swiss biodiversity monitoring program. Indicator values of species that disappeared from or colonised a site (species turnover) were compared with the indicator values of randomly chosen species from the same site. While oligotrophic plant species were more likely to colonise, compared to random expectation, only a weak shift was found

In this study, the authors examined different drivers of plant community change, that is, N deposition, climate warming, and land-use change, in Swiss mountain hay meadows

in plant community composition. In particular, the average nutrient value of plant communities remained stable over time (2003-2017). The authors found that the largest deviations from random expectation in the nutrient values of colonising species, suggesting that N deposition or other factors that change the nutrient content of soils were important drivers of the species composition change over the last 15 years in Swiss mountain hay meadows. In addition, an overall replacement of species with lower indicator values for temperature was observed with species with higher values. Apparently, the community effects of the replacement of eutrophic species with oligotrophic species was outweighed by climate warming. The authors concluded that the results add to the increasing evidence that plant communities in changing environments may be relatively stable regarding average species richness or average indicator values, but that this apparent stability is often accompanied by a marked turnover of species.

Authors: Roth T, Kohli L, Bühler C, Rihm B, Meuli RG, Meier R, Amrhein V.  
Full Source: PeerJ. 2019 Feb 6; 7:e6347. doi: 10.7717/peerj.6347.  
eCollection 2019.

### Application of essential oils as a natural and alternate method for inhibiting and inducing the sprouting of potato tubers

2019-04-23

Use of harmful chemicals and expensive maintenance of cold-storage conditions for controlling sprouting are among the major problems in potato storage. In the present study, the authors tested 20 essential oils (EOs) for their sprouting-inhibiting and sprouting-inducing activities. Overall, treatments of lemon grass (LG) and clove (CL) oils could induce sprouting whereas palmarosa (PR) and ajwain (AZ) oils could inhibit sprouting of potato tubers at normal-room-temperature ( $25 \pm 2$  °C) storage. Selected-EOs treatments affected sprouting by modulation of accumulation of reducing sugars, ethylene, and expression of genes involved in tuber-sprouting such as ARF, ARP, AIP and ERF. Surprisingly, 7-days AZ-treatments could inhibit sprouting for 30-days which was mediated via damaging apical meristem. However, LG- and CL-treated tubers could produce enhanced potato yield as well. Present work clearly demonstrates that selected-EOs can be used as a promising eco-friendly approach for inducing/inhibiting sprouting of potato tubers during

In the present study, the authors tested 20 essential oils (EOs) for their sprouting-inhibiting and sprouting-inducing activities.

potato storage and those enhancing sprouting can be used for enhancing productivity.

Authors: Shukla S, Pandey SS, Chandra M, Pandey A, Bharti N, Barnawal D, Chanotiya CS, Tandon S, Darokar MP, Kalra A.

Full Source: Food Chemistry. 2019 Jun 30; 284:171-179. doi: 10.1016/j.foodchem.2019.01.079. Epub 2019 Jan 18.

### A comparison of transgenic rodent mutation and in vivo comet assay responses for 91 chemicals

2019-04-23

A database of 91 chemicals with published data from both transgenic rodent mutation (TGR) and rodent comet assays has been compiled. The objective was to compare the sensitivity of the two assays for detecting genotoxicity. Critical aspects of study design and results were tabulated for each dataset. There were fewer datasets from rats than mice, particularly for the TGR assay, and therefore, results from both species were combined for further analysis. TGR and comet responses were compared in liver and bone marrow (the most commonly studied tissues), and in stomach and colon evaluated either separately or in combination with other GI tract segments. Overall positive, negative, or equivocal test results were assessed for each chemical across the tissues examined in the TGR and comet assays using two approaches: 1) overall calls based on weight of evidence (WoE) and expert judgement, and 2) curation of the data based on a priori acceptability criteria prior to deriving final tissue specific calls. Since the database contains a high prevalence of positive results, overall agreement between the assays was determined using statistics adjusted for prevalence (using AC1 and PABAK). These coefficients showed fair or moderate to good agreement for liver and the GI tract (predominantly stomach and colon data) using WoE, reduced agreement for stomach and colon evaluated separately using data curation, and poor or no agreement for bone marrow using both the WoE and data curation approaches. Confidence in these results is higher for liver than for the other tissues, for which there were less data. Our analysis finds that comet and TGR generally identify the same compounds (mainly potent mutagens) as genotoxic in liver, stomach and colon, but not in bone marrow. However, the current database content precluded drawing assay concordance conclusions for weak mutagens and non-DNA reactive chemicals.

Authors: Kirkland D, Levy DD, LeBaron MJ, Aardema MJ, Beevers C, Bhalli J, Douglas GR, Escobar PA, Farabaugh CS, Guerard M, Johnson GE, Kulkarni R, Le Curieux F, Long AS, Lott J, Lovell DP, Luijten M, Marchetti F, Nicolette JJ,

The objective of this study was to compare the sensitivity of the two assays for detecting genotoxicity.

## Technical

CHEMWATCH

Pfuhler S, Roberts DJ, Stankowski LF Jr, Thybaud V, Weiner SK, Williams A, Witt KL, Young R.

Full Source: Mutation Research. 2019 Mar; 839:21-35. doi: 10.1016/j.mrgentox.2019.01.007. Epub 2019 Jan 18.

### MEDICAL RESEARCH

#### In vitro evaluation of organic extractable matter from ambient PM<sub>2.5</sub> using human bronchial epithelial BEAS-2B cells: Cytotoxicity, oxidative stress, pro-inflammatory response, genotoxicity, and cell cycle deregulation

2019-04-23

A particular attention has been devoted to the type of toxicological responses induced by particulate matter (PM), since their knowledge is greatly complicated by the fact that it is a heterogeneous and often poorly described pollutant. However, despite intensive research effort, there is still a lack of knowledge about the specific chemical fraction of PM, which could be mainly responsible of its adverse health effects. The authors sought also to better investigate the toxicological effects of organic extractable matter (OEM) in normal human bronchial epithelial lung BEAS-2B cells. The wide variety of chemicals, including PAH and other related-chemicals, found in OEM, has been rather associated with early oxidative events, as supported by the early activation of the sensible NRF-2 signalling pathway. For the most harmful conditions, the activation of this signalling pathway could not totally counteract the ROS overproduction, thereby leading to critical oxidative damage to macromolecules (lipid peroxidation, oxidative DNA adducts). While NRF-2 is an anti-inflammatory, OEM exposure did not trigger any significant change in the secretion of inflammatory cytokines (i.e., TNF $\alpha$ , IL-1 $\beta$ , IL-6, IL-8, MCP-1, and IFN $\gamma$ ). According to the high concentrations of PAH and other related organic chemicals found in this OEM, CYP1A1 and 1B1 genes exhibited high transcription levels in BEAS-2B cells, thereby supporting both the activation of the critical AhR signalling pathway and the formation of highly reactive ultimate metabolites. As a consequence, genotoxic events occurred in BEAS-2B cells exposed to this OEM together with cell survival events, with possible harmful cell cycle deregulation. However, more studies are required to implement these observations and to contribute to better decipher the critical role of the organic fraction of air pollution-derived PM<sub>2.5</sub> in the activation of some sensitive signalling

The authors sought also to better investigate the toxicological effects of organic extractable matter (OEM) in normal human bronchial epithelial lung BEAS-2B cells.

## Technical

CHEMWATCH

pathways closely associated with G1/S and intra-S checkpoint blockage, on the one hand, and cell survival, on the other hand.

Authors: Abbas I, Badran G, Verdin A, Ledoux F, Roumie M, Lo Guidice JM, Courcot D, Garçon G.

Full Source: Environmental Research. 2019 Apr; 171:510-522. doi: 10.1016/j.envres.2019.01.052. Epub 2019 Jan 31.

### The impact of a quality improvement project to standardize pain, agitation, and withdrawal assessments on the use of morphine and midazolam in the Paediatric Intensive Care Unit

2019-04-23

This study aims to assess the impact of a quality improvement initiative to increase assessments of pain, agitation, and iatrogenic withdrawal syndrome, on the use of sedative and analgesic medication in a paediatric intensive care unit. This is a retrospective pre- and post, observational, quality improvement study conducted in an eighteen-bed medical-surgical-cardiac, tertiary intensive care unit. The authors included patients consecutively admitted from October 1- March 31 (pre period 2015-2016, post period 2016-2017) who were mechanically ventilated beyond 48 hours. A multidisciplinary team, including a family advisor, implemented the following interventions using rapid "Plan-Do-Study-Act cycles:" 1) standardised pain and sedation assessments, 2) standardised sedation goal setting, and 3) non-pharmacological strategies to manage pain and agitation. The authors did not implement any specific sedation protocol. Audit and feedback were used to reinforce change. The post-intervention phase started once sedation scores were documented q12h for > 60% of patients. The groups (n=45 per group) were similar regarding demographics, severity of illness, and mechanical ventilation duration, but different in length of intensive care stay. The cumulative dose of midazolam equivalent was significantly lower in the post-intervention period (3.71 vs 2.65 mg/kg/mechanical ventilation day, p 0.009, 95%CI -1.12 (-1.89, -0.31)). Morphine equivalent usage went from 3.51 vs 2.57 mg/kg/mechanical ventilation day (p 0.066, 95%CI -0.67 (-1.44, 0.05)). There were no significant pre-post differences in the use of other sedative agents, rates of iatrogenic withdrawal syndrome or severe pain, nor medication cost. Implementation of a multi-faceted QI project was successful at increasing standardised assessments of pain and agitation, and was associated with a significant reduction in midazolam use. We also observed a decrease in morphine use without increasing rates of

This study aims to assess the impact of a quality improvement initiative to increase assessments of pain, agitation, and iatrogenic withdrawal syndrome, on the use of sedative and analgesic medication in a paediatric intensive care unit.

severe pain. Incidence of iatrogenic withdrawal syndrome and cost were unchanged.

Authors: Kongkiattikul L, Dagenais M, Ruo N, Fontela P, Genova TD, Zavalkoff S.

Full Source: Pediatric Anesthesia. 2019 Jan 21. doi: 10.1111/pan.13591. [Epub ahead of print]

### Optical, electrochemical and catalytic methods for in-vitro diagnosis using carbonaceous nanoparticles: a review

2019-04-23

This review summarises the progress that has been made in the field of in-vitro diagnosis using carbonaceous nanoparticles (CNPs). Signal readout is mostly based on fluorometry, electrochemistry and colorimetry. Following an introduction, the next two sections cover methods for the fabrication and separation of CNPs. This is followed by sections on (a) fluorometric methods, (b) electrochemical methods, and (c) colorimetric methods for detecting various analytes. Several subsections discuss detection schemes for analytes such as metal ions, pH value, reactive oxygen species, small biogenic molecules (for example glucose, ascorbic acid, amino acids, dopamine), and biomacromolecules (such as enzymes, cancer markers, DNA). A further section discusses methods based on the peroxidase-like activity of CNPs, and how they can be employed for the determination of species such as glucose, cholesterol, glutathione, and uric acid via H<sub>2</sub>O<sub>2</sub>-based chromogenic methods. Finally, the challenges and future perspectives in this research area are discussed. A review is presented on the progress that has been made in recent years in sensing platforms for in-vitro diagnosis using carbonaceous nanoparticles (CNPs). Signal readout is mostly based on fluorometry, electrochemistry and colorimetry, respectively. Besides, the fabrication and separation strategies of CNPs are also demonstrated.

Authors: Wang Y, Xia Y.

Full Source: Mikrochim Acta. 2019 Jan 5;186(1):50. doi: 10.1007/s00604-018-3110-1.

This review summarises the progress that has been made in the field of in-vitro diagnosis using carbonaceous nanoparticles (CNPs).

## Technical

CHEMWATCH

### Quality of INR control and switching to non-Vitamin K oral anticoagulants between women and men with atrial fibrillation treated with Vitamin K Antagonists in Spain. A population-based, real-world study

2019-04-23

Worldwide, there is growing evidence that quality of international normalised ratio (INR) control in atrial fibrillation patients treated with Vitamin K Antagonists (VKA) is suboptimal. However, sex disparities in population-based real-world settings have been scarcely studied, as well as patterns of switching to second-line Non-VKA oral anticoagulants (NOAC). In this study, the authors aimed to assess the quality of INR control in atrial fibrillation patients treated with VKA in the region of Valencia, Spain, for the whole population and differencing by sex, and to identify factors associated with poor control. The authors also quantified switching to Non-VKA oral anticoagulants (NOAC) and we identified factors associated to switching. This is a cross-sectional, population-based study. Information was obtained through linking different regional electronic databases. Outcome measures were Time in Therapeutic Range (TTR) and percentage of INR determinations in range (PINRR) in 2015, and percentage of switching to NOAC in 2016, for the whole population and stratified by sex. 22,629 patients were included, 50.4% were women. Mean TTR was 62.3% for women and 63.7% for men, and PINRR was 58.3% for women and 60.1% for men ( $p < 0.001$ ). Considering the  $TTR < 65\%$  threshold, 53% of women and 49.3% of men had poor anticoagulation control ( $p < 0.001$ ). Women, long-term users antiplatelet users, and patients with comorbidities, visits to Emergency Department and use of alcohol were more likely to present poor INR control. 5.4% of poorly controlled patients during 2015 switched to a NOAC throughout 2016, with no sex differences. The quality of INR control of all AF patients treated with VKA in 2015 in our Southern European region was suboptimal, and women were at a higher risk of poor INR control. This reflects sex disparities in care, and programs for improving the quality of oral anticoagulation should incorporate the gender perspective. Clinical inertia may be lying behind the observed low rates of switching in patient with poor INR control.

Authors: García-Sempere A, Hurtado I, Bejarano-Quisoboni D, Rodríguez-Bernal C, Santa-Ana Y, Peiró S, Sanfélix-Gimeno G.

Full Source: PLoS One. 2019 Feb 12; 14(2):e0211681. doi: 10.1371/journal.pone.0211681. eCollection 2019.

## Technical

CHEMWATCH

### Effects of intravenous oxycodone alone or in combination with naltrexone on measures of respiratory depression: a randomised placebo-controlled study

2019-04-23

Abuse of prescription opioids, particularly by intravenous (IV) administration, can cause respiratory depression and death. ALO-02, an abuse-deterrent opioid formulation, is designed to release sequestered naltrexone upon manipulation by crushing, thereby antagonising the pharmacologic effects of oxycodone. This exploratory post-hoc analysis examined the effects of IV administration of simulated crushed ALO-02 on end-tidal carbon dioxide (EtCO<sub>2</sub>), a surrogate marker of respiratory depression. Data were obtained from a randomised, double-blind, placebo-controlled, three-way crossover study in nondependent recreational opioid users that evaluated the abuse potential of IV administered oxycodone 20 mg + naltrexone 2.4 mg (simulating crushed ALO-02) versus oxycodone 20 mg or placebo. EtCO<sub>2</sub> was measured as a secondary endpoint using non-invasive capnography at baseline and post-dose intervals, up to 24 h. Baseline EtCO<sub>2</sub> (mean ± standard error of the mean (SEM)) values (n = 33) were similar across treatments: 33.5 ± 0.9, 33.5 ± 0.8, and 34.0 ± 0.7 mmHg for oxycodone 20 mg + naltrexone 2.4 mg, oxycodone 20 mg, and placebo, respectively. After dosing, mean ± SEM of the maximum effect (E<sub>max</sub>) on EtCO<sub>2</sub> was 37.5 ± 0.6, 40.5 ± 0.8, and 36.9 ± 0.6 mmHg for oxycodone 20 mg + naltrexone 2.4 mg, oxycodone 20 mg, and placebo, respectively. E<sub>max</sub> values were significantly lower for oxycodone 20 mg + naltrexone 2.4 mg versus oxycodone 20 mg (p = 0.0005), and not different from placebo (p > 0.05). The authors concluded that this abuse-potential study suggests that naltrexone released from ALO-02 tampering by crushing attenuates oxycodone-induced increase of EtCO<sub>2</sub> in non-dependent recreational opioid users.

Authors: Bass A, Webster LR, Matschke KT, Malhotra BK, Wolfram G.

Full Source: Therapeutic Advances in Drug Safety. 2019 Feb 1;

10:2042098618821274. doi: 10.1177/2042098618821274. eCollection

2019.

In this study, occupational exposure to volatile organic compounds (VOCs) in the rendering plant of poultry slaughterhouse was determined

### OCCUPATIONAL RESEARCH

#### Probabilistic risk assessment of occupational exposure to volatile organic compounds in the rendering plant of a poultry slaughterhouse

2019-04-23

In this study, occupational exposure to volatile organic compounds (VOCs) in the rendering plant of poultry slaughterhouse was determined and subsequently, carcinogen and non-carcinogenic risks were assessed using the US Environmental Protection Agency (USEPA). National Institute for Occupational Safety and Health (NIOSH) methods of 1501 and 1600 were used to measure VOCs in the breathing zone of the workers. Samples were analysed by GC/MS. Carcinogenic and non-carcinogenic risks and sensitivity analysis were carried out using Monte Carlo simulations technique. The concentration of benzene and CS<sub>2</sub> was higher than the occupational exposure limits (OEL). The hazard quotient (HQ) values for all measured compounds was more than 1, which indicating the high potential for non-carcinogenic risks. Furthermore, the calculated Lifetime Cancer Risks (LCR) for carcinogenic compounds revealed that cancer risk due to benzene is higher than the maximum acceptable level provided by USEPA (10<sup>-6</sup>). Based on the sensitivity analysis, the concentration and exposure frequency are the most important variable influencing both carcinogen and non-carcinogenic risks. Therefore, the concentration levels of the VOCs and exposure frequency should be controlled using engineering control measures.

Authors: Omidi F, Dehghani F, Fallahzadeh RA, Miri M, Taghavi M, Eynipour A.

Full Source: *Ecotoxicology & Environmental Safety*. 2019 Jul 30; 176:132-136. doi: 10.1016/j.ecoenv.2019.03.079. Epub 2019 Mar 27.

#### Innovations in Worksite Diagnosis of Urinary Tract Infections and the Occupational Health Nurse

2019-04-23

Occupational health nurses play a key role in evaluating innovative technologies that can aid in providing safe and rapid care and reduce lost work time. A nurse-led employee health clinic participated in a validation study of a novel pathogen detection technique developed by GeneCapture, Inc. Their proposed portable urinary tract infection (UTI) in vitro diagnostic test was challenged with discarded, deidentified urine samples from patients presenting with typical UTI symptoms

collected at two university clinics and two multiphysician practices. GeneCapture's panel for this study was designed to rapidly identify the genetic signature of seven organisms: gram-negative *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, and *Pseudomonas aeruginosa*; gram-positive *Enterococcus faecalis* and *Staphylococcus aureus*; and fungal *Candida* species. The results from 40 clinical samples were in 95% agreement (90% specificity, 100% sensitivity) with traditional urine culture results from routine analysis. This successful occupational health nursing collaboration and validation study shows promise for point-of-care diagnoses and earlier treatment for workers with UTIs.

Authors: O'Keefe LC, Koelle P, McGee Z, Dewberry LS, Wright C, Stallings JE, Gates E, Chittur K.

Full Source: Workplace Health & Safety. 2019 Mar 29:2165079919834310. doi: 10.1177/2165079919834310. [Epub ahead of print]

### Urinary trimethyl tin reflects blood trimethyl tin in workers recycling organotins

2019-04-23

A recent case report of organotin intoxication showed higher ratio of urinary trimethyl tin (TMT) to dimethyl tin (DMT) than those of the previous cases exposed to only DMT, suggesting co-exposure to DMT and TMT occurred. The present study investigated how urinary TMT and DMT reflect blood TMT and DMT, respectively, to evaluate them as biomarkers for TMT/DMT exposure. DMT and TMT from blood collected at different time points from three patients intoxicated with organotins were measured with HPLC-ICP/MS. Previously published data of urinary DMT and TMT were used for comparison. Regression analyses were conducted with dependent variable of blood DMT and TMT and independent variable of urinary DMT and TMT, respectively. Multiple regression analysis with dummy variables of individual was also conducted. Regression analysis did not show significant relation of urinary TMT to blood TMT or relation of urinary DMT to blood DMT, although the former was marginal. Multiple regression analysis showed significantly positive relation of urinary TMT to blood TMT. The authors concluded that the study shows that urinary TMT reflects blood TMT. In co-exposure to TMT and DMT, urinary TMT can be an internal exposure marker of TMT, which might be not only derived from external exposure to TMT but also converted from DMT in human body.

Authors: Ichihara G, Iida M, Watanabe E, Fujie T, Kaji T, Lee E, Kim Y.

Full Source: Journal of Occupational Health. 2019 Mar 28. doi: 10.1002/1348-9585.12052. [Epub ahead of print]

The present study investigated how urinary trimethyl tin and dimethyl tin reflect blood trimethyl tin and dimethyl tin, respectively, to evaluate them as biomarkers for TMT/DMT exposure.

## Technical

CHEMWATCH

### The quantitative and qualitative parameters of rhythytcograms in methanol and formaldehyde impact in production environment

2019-04-23

This study assessed the state of the mucous membrane of the upper respiratory tract of the workers of chemical production of methanol and formaldehyde. A total of 450 workers were examined by rhinocytogram (RCH) evaluation. As a result of the study, studies have found that people with work experience of up to 10 years in the production of methanol and formaldehyde in the RCH the signs of chronic inflammation is more likely to be detected. More experienced patients (more than 10 years of work experience) studies have found the establishment of morphological signs of protective and degenerative changes in ciliated epithelium, and there is a high degree of connection between the development of protective changes and the exposure to chemicals (RR = 2.71, aetiological share, EF = 56.4%) and the development of degenerative changes (RR = 3.28, EF = 65.4%). These results are considered by the authors as the biomarkers of the development of a professionally conditioned lesion of the upper respiratory tract.

Authors: Bankovskaya LA, Shchekotova AP, Malyutina NN.

Full Source: Kliniceskaja Laboratornaja Diagnostika. 2019;64(2):78-82. doi: 10.18821/0869-2084-2019-64-2-78-82.

### Health Risks of Polybrominated Diphenyl Ethers (PBDEs) and Metals at Informal Electronic Waste Recycling Sites

2019-04-23

Concerns about the adverse public health consequences of informal electronic waste (e-waste) recycling are increasing. This study adopted a cross-sectional study design to gain insights into health risks (cancer and non-cancer risks) associated with exposure to e-waste chemicals among informal e-waste workers via three main routes: Dermal contact, ingestion, and inhalation. The e-waste chemicals (PBDE and metals) were measured in the dust and top soils at e-waste sites (burning, dismantling, and repair sites). Adverse health risks were calculated using the EPA model developed by the Environmental Protection Agency of the United States. The concentrations of the e-waste chemicals and the health risks at the e-waste sites increased as the intensity of the e-waste recycling activities increased: control sites < repair sites < dismantling sites < burning sites. Dermal contact was the main route of exposure while exposure via inhalation was negligible for both carcinogenic and

This study adopted a cross-sectional study design to gain insights into health risks (cancer and non-cancer risks) associated with exposure to e-waste chemicals among informal e-waste workers

## Technical

CHEMWATCH

non-carcinogenic risks. Cumulative health risks via all routes of exposure (inhalation, ingestion, and dermal contact) exceeded the acceptable limits of both non-cancer effects and cancer risk at all e-waste sites. This indicates that overall the e-waste workers are at the risk of adverse health effects. Therefore, the importance of occupational safety programs and management regulations for e-waste workers cannot be over emphasised.

Authors: Ohajinwa CM, van Bodegom PM, Osibanjo O, Xie Q, Chen J, Vijver MG, Peijnenburg WJGM.

Full Source: International Journal of Environmental Research & Public Health. 2019 Mar 13;16(6). pii: E906. doi: 10.3390/ijerph16060906.

## PUBLIC HEALTH RESEARCH

### Lactational exposure to phthalates impaired the neurodevelopmental function of infants at 9 months in a pilot prospective study

2019-04-23

Phthalates are widespread endocrine-disrupting chemicals (EDCs) that have been suggested to affect neurodevelopment. However, association between lactational exposure to phthalates and neurodevelopmental effects has rarely been reported in epidemiological studies. In the present study, the authors conducted a pilot prospective study of 138 mother-infant pairs to evaluate whether lactational exposure to phthalates was associated with neurodevelopmental effects in infants. At baseline survey, the spot urine samples from both mothers and infants were collected for measuring ten metabolites of phthalates, and the food intake information of infants was assessed by the food-frequency questionnaire (FFQ). At the follow-up survey in 9 months of age, the neurodevelopmental Function of infants was assessed using the Ages and Stages Questionnaire Edition 3 (ASQ-3). Multivariate logistic regression models were used to calculate the odds ratio (OR) for delayed development according to the level of exposure to phthalates. The results indicated that MnBP and MiBP were high in lactating infants and mothers. In the overall study population, most metabolites showed positive associations with delayed development of most ASQ-3 domains. In male, MMP, MEP, MiBP and MnBP but not DEHP metabolites were significantly associated with increased odds of delayed development of all domains. In female, most LMWP metabolites and the four oxidative metabolites of DEHP were significantly associated with increased odds of delayed development of most domains. In conclusion, the authors found a significant negative association between

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## Technical

CHEMWATCH

lactational exposure to phthalates and ASQ-3 domains. Some of the sex-specific observations warrant further investigation. The dietary source of lactational phthalates exposure may not be the breast milk or infant formula but the complementary food.

Authors: Dong R, Wu Y, Chen J, Wu M, Li S, Chen B.

Full Source: Chemosphere. 2019 Mar 28; 226:351-359. doi: 10.1016/j.chemosphere.2019.03.159. [Epub ahead of print]

### Mercury levels in blood, urine and hair in a nation-wide sample of Spanish adults

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Mercury (Hg) is among the top 10 environmental chemicals of major public health concern (WHO). The Minamata Convention on Mercury (United Nations Environment Program, 2017), commits signing countries to control anthropogenic mercury emissions and reduce human exposure. Human biomonitoring (HBM) programs, are the most straight-forward approaches to get information on the actual exposure levels in the population and assess over time. In this study, the authors report the results of a HBM study in a nationwide cross-section of Spanish adults (18-65y) as baseline values obtained before the Minamata Convention entered into force. Subsequent follow-ups will show if the Convention has been successful. The study includes 1880 blood samples, 1704 urine samples and 577 hair samples from all Spanish regions collected and analysed under a strictly quality controlled and quality assured protocol. The EU-DEMOCOPHES project demonstrated that fish and seafood are the major sources of mercury exposure and that the Spanish as well as the Portuguese populations have higher levels than other European countries. The data from the present study confirms this pattern at national level and that inhabitants in coastal regions have higher values than from inland regions. The geometric mean (GM) for blood is 6.35 µg Hg/l, in urine is 1.11 µg Hg/l and for hair is 1.91 µg Hg/g. In an international comparison these values are not exceptional. Spanish concentrations fall into the group of Eastern Mediterranean populations. Although information on gender, age, occupational sector, geographical area, sampling period and frequency of fish consumption is reported in the tables, the purpose of this paper has not been to analyse the determinants of exposure in

The purpose of this study was to determine the potential health risks of substances that exist in car colorant products.

detail but to provide baseline data for future assessments and for regional authorities.

Authors: Castaño A, Pedraza-Díaz S, Cañas AI, Pérez-Gómez B, Ramos JJ, Bartolomé M, Pärt P, Soto EP, Motas M, Navarro C, Calvo E, Esteban M; Bioambient.es.

Full Source: Science of the Total Environment. 2019 Mar 13; 670:262-270. doi: 10.1016/j.scitotenv.2019.03.174. [Epub ahead of print]

### Potential Health Risks of Chemicals in Car Colorant Products

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Public concern regarding the use of products with chemicals has increased in Korea, following reports indicating that hazardous chemicals in products, such as disinfectants, can cause fatal lung disease. Despite the widespread use of car colorant products, little is known regarding their potential health risks. The purpose of this study was to determine the potential health risks of substances that exist in car colorant products. Thirteen car colorant products were purchased from the Korean market and 15 commonly used chemicals were analysed. Exposure and risk assessments were conducted in two assessment stages (screening and refined). The analysis showed that all of the examined products contained toluene, ethylbenzene, and xylene. The maximum concentration of toluene was 52.5%, with a median concentration of 10.8%. Tier 1 (screening) assessment showed that four chemicals (toluene, ethylbenzene, xylene, and 2-butoxyethanol) may pose health risks, but tier 2 (refined) assessment showed that these chemicals do not pose any risk. However, these chemicals were present in all of the examined products, and government regulations did not control their concentrations in these products. Therefore, the authors suggest that levels of toluene, ethylbenzene, and xylene in car colorant products should be regulated to protect public health.

Authors: Lee D, Kim JH, Hwang M, Lim H, Seok K.

Full Source: International Journal of Environmental Research & Public Health. 2019 Mar 14;16(6). pii: E913. doi: 10.3390/ijerph16060913.

### Changing prevalence of current asthma and inhaled corticosteroid treatment in the UK: population-based cohort 2006-2016

2019-04-23

Asthma is the most common respiratory disorder in the UK, yet we have incomplete knowledge on the prevalence of current disease, treatment

and exacerbations. During the present study, the authors used UK electronic healthcare records, 2006-2016, to estimate the prevalence of current asthma by year, gender and age (<5, 5-11, 12-17, 18-24, 25-54 and ≥55 years), and the proportion prescribed inhaled corticosteroids (ICS) and additional asthma-therapy, treated for exacerbations and other asthma care markers. Overall current asthma prevalence was 6.5% in 2016 (7.2% in 2006). Prevalence fell in those under 45 years. The lowest prevalence and largest absolute decrease was in children under 5-years. In 2016, 80% of current asthma patients were managed on ICS, (65% in 2006); this increase occurred in all ages, primarily due to an increase in low-dose ICS. During this time there was an increase in all age-groups in the proportion prescribed additional asthma-therapy, treated for an exacerbation within primary care, given an annual asthma review or management plan. Hospitalised exacerbations showed minimal change over time. Asthma remains highly prevalent and a significant healthcare burden. In those with a diagnosis, there was an increase in ICS prescriptions and treatment of exacerbations across all age-groups. This may reflect a trend towards more aggressive asthma management within primary care. An apparent decline in prevalence was observed in those aged under 45 years, particularly in children under 5 years.

Authors: Bloom CI, Saglani S, Feary J, Jarvis D, Quint JK.

Full Source: European Respiratory Journal 2019 Feb 14. pii: 1802130. doi: 10.1183/13993003.02130-2018. [Epub ahead of print]

### Assessment of human oestrogen receptor agonistic/antagonistic effects of veterinary drugs used for livestock and farmed fish by OECD in vitro stably transfected transcriptional activation assays

2019-04-23

The presence of veterinary drug residues in foods and the environment could potentially cause adverse effects on humans and wildlife. Several veterinary drugs were reported to exhibit endocrine disrupting effects via binding affinities to sexual hormone receptors such as oestrogen and androgen receptors. Therefore, the authors confirmed the human oestrogen receptor (ER) agonistic/antagonistic effects of 135 chemicals that were used as veterinary drugs in Korea by the official Organization for Economic Cooperation and Development (OECD) in vitro ER transcriptional activation (TA) assay using the VM7Luc4E2 cell line. In the case of ER agonist screening, 7 veterinary drugs (cefuroxime, cymiazole, trenbolone, zeranol, phoxim, altrenogest and nandrolone) were determined to be ER agonists. In addition, only zeranol was found to

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## Technical

CHEMWATCH

exhibit weak ER antagonistic activity. These 7 veterinary drugs, which were determined as ER agonists and/or antagonists by an OECD in vitro assay, were also found to have binding affinity to ERs. These results indicate that various veterinary drugs possess potential (anti-)oestrogenic effects. However, further study is needed to determine the precise endocrine-disrupting effects of these compounds.

Authors: Lee HS, Kim NY, Song Y, Oh GY, Jung DW, Jeong DH, Kang HS, Oh HS, Park Y, Hong JS, Koo YE.

Full Source: Toxicology In Vitro. 2019 Feb 10. pii: S0887-2333(18)30384-9. doi: 10.1016/j.tiv.2019.02.003. [Epub ahead of print]