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ENVIRONMENTAL RESEARCH

Persistent organic pollutants in typical lake ecosystems

2019-07-29

Persistent organic pollutants (POPs) are highly toxic organic chemicals. Lakes are one of the main sinks of POPs. POPs can be accumulated in multiple matrices in lake ecosystems and biomagnified through the food web, and thus pose a potential threat not only to lake ecosystems, but also to human health. Given their potential persistent risks, they have received much attention over the past decades. This review comprehensively summarises the data on the levels and distributions of POPs in selected typical lake ecosystems in China and worldwide, involving water, sediments, organisms, and surrounding soils and atmosphere. It was found that current publications on POPs in Chinese lakes are mainly related to lakes in the developed eastern plain area, with only a few studies concerning the less-developed Qinghai-Tibet Plateau area. Similarly, around the world, there are more research on POPs in developed countries and less in relatively less-developed areas. Moreover, there are significant differences in the levels of POPs in different matrices in different lake ecosystems. Legacy POPs, such as polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs), and polybrominated diphenyl ethers (PBDEs), were commonly detected and reported in different lakes, while emerging POPs like perfluorinated compounds (PFCs), polychlorinated naphthalenes (PCNs), Tetrabromobisphenol A (TBBPA), and hexabromocyclododecane (HCBD) were relatively less detected or reported. A comprehensive summarisation on the levels and distributions of traditional and emerging POPs in lake ecosystems could be significant for further understanding the behaviours and risks of POPs in lake ecosystems.

Authors: Li C, Yang L, Shi M, Liu G.

Full Source: *Ecotoxicology & Environmental Safety*. 2019 Sep 30; 180:668-678. doi: 10.1016/j.ecoenv.2019.05.060. Epub 2019 May 27.

This review comprehensively summarises the data on the levels and distributions of POPs in selected typical lake ecosystems in China and worldwide

Horticultural oils: possible alternatives to chemical pesticides and insecticides

2019-07-29

The farmers and agrochemical industries lack science-based knowledge about sustainable utilisation of pesticides and insecticides. The investigation on rising use of chemical pesticides and insecticides has

remarkable issue related to environment pollution, soil fertility, and human health; as such, nowadays, many people prefer natural alternatives over synthetic chemicals. Natural products, like horticultural oils, play a significant role for sustainable and safe integrated pest management, providing natural alternatives to chemical pesticides and insecticides. For several decades, both plant- and petroleum-based spray oils have been always used to control various pests, mites, and insects. Currently, these horticultural oils are used as a part of the integrated pest management, which utilises secure and non-chemical pesticides rather than conventional pesticides. Horticultural oil refers to a complex mixture of hydro-carbons with traces of sulfur- and nitrogen-based compounds, extracted from plants. The key components of horticultural oils include paraffin and olefin. The horticultural oils are considered suitable since they are non-toxic to both plants and animals, are applied easily, have low risk properties, cost-effective, and play significant role in pest control, but show little effects on the beneficial insects. As a result, these attributes make horticultural oils to be considered as secure and effective alternative for chemical insecticides and pesticides for both commercial and domestic agriculture.

Authors: Nile AS, Kwon YD, Nile SH.

Full Source: Environmental Science & Pollution Research International.

2019 May 29. doi: 10.1007/s11356-019-05509-z. [Epub ahead of print]

Inhibition of *Pseudomonas aeruginosa* biofilm formation and expression of virulence genes by selective epimerization in the peptide Esculentin-1a(1-21)NH₂

2019-07-29

Pseudomonas aeruginosa is a pathogenic bacterium known to cause serious human infections, especially in immune-compromised patients. This is due to its unique ability to transform from a drug-tolerant planktonic to a more dangerous and treatment-resistant sessile life form, called biofilm. Recently, two derivatives of the frog skin antimicrobial peptide esculentin-1a, i.e. Esc(1-21) and its D-amino acids containing diastereomer Esc(1-21)-1c, were characterised for their powerful anti-Pseudomonas activity against both forms. Prevention of biofilm formation already in its early stages could be even more advantageous for counteracting infections induced by this bacterium. In this study, the authors investigated how the diastereomer Esc(1-21)-1c can inhibit *Pseudomonas* biofilm formation in comparison to the parent peptide and two clinically-used conventional antibiotics, i.e. colistin and aztreonam, when applied at dosages below the minimal growth inhibitory

In this study, the authors investigated how the diastereomer Esc(1-21)-1c can inhibit *Pseudomonas* biofilm formation in comparison to the parent peptide and two clinically-used conventional antibiotics

concentration. Biofilm prevention was correlated to the peptides' ability to inhibit *Pseudomonas* motility and to reduce the production of virulent metabolites, for example, pyoverdine and rhamnolipids. Furthermore, the molecular mechanism underlying these activities was evaluated by studying the peptides' effect on the expression of key genes involved in the virulence and motility of bacteria, as well as by monitoring the peptides' binding to the bacterial signalling nucleotide ppGpp. The results demonstrate that the presence of only two D-amino acids in Esc(1-21)-1c is sufficient to downregulate ppGpp-mediated expression of biofilm-associated genes, presumably as a result of higher peptide stability and therefore prolonged interaction with the nucleotide. Overall, these studies should assist efficient design and optimization of new anti-infective agents with multiple pharmacologically beneficial properties.

Authors: Casciaro B, Lin Q, Afonin S, Loffredo MR, de Turrís V, Middel V, Ulrich AS, Di YP, Mangoni ML.

Full Source: FEBS Journal. 2019 May 30. doi: 10.1111/febs.14940. [Epub ahead of print]

Phylogeny, Divergent Evolution, and Speciation of Sulfur-Oxidising *Acidithiobacillus* Populations

2019-07-29

Habitats colonised by acidophiles as an ideal physical barrier may induce genetic exchange of microbial members within the common communities, but little is known about how species in extremely acidic environments diverge and evolve. Using the acidophilic sulfur-oxidiser *Acidithiobacillus* as a case study, taxonomic reclassifications of many isolates provides novel insights into their phylogenetic lineage. Whole-genome-based comparisons were attempted to investigate the intra- and inter-species divergence. Recent studies clarified that functional and structural specificities of bacterial strains might provide opportunities for adaptive evolution responding to local environmental conditions. Acidophilic microorganisms play a key role in the acidification of natural waters and thus the formation of extremely acidic environments, and the feedbacks of the latter might confer the distinct evolutionary patterns of *Acidithiobacillus* spp. Varied horizontal gene transfer events occurred in different bacterial strains, probably resulting in the expansion of *Acidithiobacillus* genomes. Gene loss as another evolutionary force might cause the adaptive phenotypic diversity. A conceptual model for potential community-dependent evolutionary adaptation was thus proposed to illustrate the observed genome differentiation. Collectively, the findings shed light on the phylogeny and divergent evolution of *Acidithiobacillus*

strains, and provided a useful reference for evolutionary studies of other extremophiles.

Authors: Zhang X, Liu X, Li L, Wei G, Zhang D, Liang Y, Miao B.

Full Source: BMC Genomics. 2019 May 30;20(1):438. doi: 10.1186/s12864-019-5827-6.

Toxicity Studies of Chanoclavine in Mice

2019-07-29

Epichloë endophytes have been used successfully in pastoral grasses providing protection against insect pests through the expression of secondary metabolites. This approach could be extended to other plant species, such as cereals, reducing reliance on pesticides. To be successful, the selected endophyte must express secondary metabolites that are active against cereal insect pests without any secondary metabolite, which is harmful to animals. Chanoclavine is of interest as it is commonly expressed by endophytes and has potential insecticidal activity.

Investigation of possible mammalian toxicity is therefore required. An acute oral toxicity study showed the median lethal dose of chanoclavine to be >2000 mg/kg. This allows it to be classified as category 5 using the globally harmonised system of classification and labelling of chemicals, and category 6.1E using the New Zealand Hazardous Substances and New Organisms (HSNO) hazard classes, the lowest hazard class under both systems of classification. A three-week feeding study was also performed, which showed chanoclavine, at a dose rate of 123.9 mg/kg/day, initially reduced food consumption but was resolved by day seven. No toxicologically significant effects on gross pathology, histology, haematology, or blood chemistry were observed. These experiments showed chanoclavine to be of low toxicity and raised no food safety concerns.

Authors: Finch SC, Munday JS, Sprosen JM, Bhattarai S.

Full Source: Toxins (Basel). 2019 May 2;11(5). pii: E249. doi: 10.3390/toxins11050249.

Chanoclavine is of interest as it is commonly expressed by endophytes and has potential insecticidal activity.

MEDICAL RESEARCH

Evaluation of gilteritinib in combination with chemotherapy in preclinical models of FLT3-ITD+ acute myeloid leukaemia

2019-07-29

Activating internal tandem duplication (ITD) and tyrosine kinase domain (TKD) point mutations in Fms-like tyrosine kinase 3 (FLT3) occur in approximately 30% of patients with acute myeloid leukemia (AML), and confer a poor prognosis with standard cytarabine/anthracycline or azacitidine-based chemotherapy regimens. Gilteritinib is a highly-specific, potent FLT3/AXL inhibitor with demonstrated activity against FLT3-ITD and FLT3-TKD mutations. Compared with salvage chemotherapy, treatment with once-daily oral gilteritinib demonstrated a clinical benefit in patients with FLT3-mutated relapsed/refractory AML, which led to its recent approval in Japan and the United States. The authors investigated the effects of gilteritinib combined with cytarabine plus daunorubicin/ idarubicin, or combined with azacitidine in human FLT3-ITD-positive (FLT3-ITD +) AML cell lines and xenografted mouse models. Gilteritinib induced G1 arrest and apoptosis in a dose-dependent manner. The addition of cytarabine, daunorubicin, idarubicin, or azacitidine potentiated apoptosis. Gilteritinib alone or combined with cytarabine, daunorubicin, idarubicin, or azacitidine, inhibited anti-apoptotic protein expression in MV4-11 cells. In xenografted mice, administration of cytarabine, idarubicin, or azacitidine in combination with gilteritinib had little impact on plasma or intratumor PK profiles of gilteritinib, cytarabine, idarubicin, or azacitidine. Gilteritinib combined with chemotherapy reduced tumour volume to a greater extent than either gilteritinib or chemotherapy alone. Of note, the addition of cytarabine plus daunorubicin/ idarubicin led to tumour regression in mice, with complete regression observed in six out of eight mice in both triple combination groups. These findings support the investigation of gilteritinib combined with chemotherapy in patients with FLT3-ITD + AML, including those who are ineligible for intensive chemotherapy.

Authors: Ueno Y, Mori M, Kamiyama Y, Saito R, Kaneko N, Isshiki E, Kuromitsu S, Takeuchi M.

Full Source: *Oncotarget*. 2019 Apr 2;10(26):2530-2545. doi: 10.18632/oncotarget.26811. eCollection 2019 Apr 2.

Redox (phospho)lipidomics of signalling in inflammation and programmed cell death

2019-07-29

In addition to the known prominent role of polyunsaturated (phospho) lipids as structural blocks of biomembranes, there is an emerging understanding of another important function of these molecules as a highly diversified signalling language utilised for intra- and extracellular communications. Technological developments in high-resolution mass spectrometry facilitated the development of a new branch of metabolomics, redox lipidomics. Analysis of lipid peroxidation reactions has already identified specific enzymatic mechanisms responsible for the biosynthesis of several unique signals in response to inflammation and regulated cell death programs. Obtaining comprehensive information about millions of signals encoded by oxidised phospholipids, represented by thousands of interactive reactions and pleiotropic (patho)physiological effects, is a daunting task. However, there is still reasonable hope that significant discoveries, of at least some of the important contributors to the overall overwhelmingly complex network of interactions triggered by inflammation, will lead to the discovery of new small molecule regulators and therapeutic modalities. For example, suppression of the production of AA-derived pro-inflammatory mediators, HXA3 and LTB4, by an iPLA2 γ inhibitor, R-BEL, mitigated injury associated with the activation of pro-inflammatory processes in animals exposed to whole-body irradiation. Further, technological developments promise to make redox lipidomics a powerful approach in the arsenal of diagnostic and therapeutic instruments for personalised medicine of inflammatory diseases and conditions.

Authors: Tyurina YY, St Croix CM, Watkins SC, Watson AM, Epperly MW, Anthonymuthu TS, Kisin ER, Vlasova II, Krysko O, Krysko DV, Kapralov AA, Dar HH, Tyurin VA, Amoscato AA, Popova EN, Bolevich SB, Timashev PS, Kellum JA, Wenzel SE, Mallampalli RK, Greenberger JS, Bayir H, Shvedova AA, Kagan VE.

Full Source: Journal of Leukocyte Biology. 2019 May 9. doi: 10.1002/JLB.3MIR0119-004RR. [Epub ahead of print]

Improved, point-of-care diagnostic tests for visceral leishmaniasis (VL), early case detection and surveillance are required.

Refining wet lab experiments with in silico searches: A rational quest for diagnostic peptides in visceral leishmaniasis

2019-07-29

The search for diagnostic biomarkers has been profiting from a growing number of high-quality sequenced genomes and freely available bioinformatic tools. These can be combined with wet lab experiments for a rational search. Improved, point-of-care diagnostic tests for visceral leishmaniasis (VL), early case detection and surveillance are required. Previous investigations demonstrated the potential of IgG1 as a biomarker for monitoring clinical status in rapid diagnostic tests (RDTs), although using a crude lysate antigen (CLA) as capturing antigen. Replacing the CLA by specific antigens would lead to more robust RDTs. Immunoblots revealed *L. donovani* protein bands detected by IgG1 from VL patients. Upon confident identification of these antigens by mass spectrometry (MS), the authors searched for evidence of constitutive protein expression and presence of antigenic domains or high accessibility to B-cells. Selected candidates had their linear epitopes mapped with in silico algorithms. Multiple high-scoring predicted epitopes from the shortlisted proteins were screened in peptide arrays. The most promising candidate was tested in RDT prototypes using VL and nonendemic healthy control (NEHC) patient sera. Over 90% of the proteins identified from the immunoblots did not satisfy the selection criteria and were excluded from the downstream epitope mapping. Screening of predicted epitope peptides from the shortlisted proteins identified the most reactive, for which the sensitivity for IgG1 was 84% (95% CI 60-97%) with Sudanese VL sera on RDT prototypes. None of the sera from NEHCs were positive. The authors employed in silico searches to reduce drastically the output of wet lab experiments, focusing on promising candidates containing selected protein features. By predicting epitopes in silico, a large number of peptides were screened using arrays, identifying the most promising one, for which IgG1 sensitivity and specificity, with limited sample size, supported this proof of concept strategy for diagnostics discovery, which can be applied to the development of more robust IgG1 RDTs for monitoring clinical status in VL.

Authors: Bremer Hinckel BC, Marlais T, Airs S, Bhattacharyya T, Imamura H, Dujardin JC, El-Safi S, Singh OP, Sundar S, Falconar AK, Andersson B, Litvinov S, Miles MA, Mertens P.

Full Source: PLOS Neglected Tropical Diseases. 2019 May 6;13(5):e0007353. doi: 10.1371/journal.pntd.0007353. eCollection 2019 May.

Combined balloon decompression and epidural adhesiolysis has been reported to be effective in refractory lumbar spinal stenosis.

Relationship of Success Rate for Balloon Adhesiolysis with Clinical Outcomes in Chronic Intractable Lumbar Radicular Pain: A Multicentre Prospective Study

2019-07-29

Combined balloon decompression and epidural adhesiolysis has been reported to be effective in refractory lumbar spinal stenosis. Many cases of intractable stenosis have symptom-related multiple target sites for interventional treatment. In this situation it may not be possible to perform balloon adhesiolysis, or even only epidural adhesiolysis, for all target sites. Therefore, this multicentre prospective observational study aimed to evaluate the relationship of successful ballooning rate for multiple target sites with clinical outcome. Based on the ballooning success rate of multiple target sites, the patients were divided into three groups: below 50%, 50-85%, and above 85% ballooning. A greater ballooning success rate for multiple target sites provided a more decreased pain intensity and improved functional status in patients with chronic refractory lumbar spinal stenosis, and the improvement was maintained for 6 months. The estimated proportions of successful responders according to a multidimensional approach in the below 50%, 50-85%, and above 85% balloon success groups at 6 months after the procedure were 0.292, 0.468, and 0.507, respectively ($p = 0.038$). This study suggests the more successful balloon adhesiolysis procedures for multiple target lesions are performed, the better clinical outcome can be expected at least 6 months after treatment.

Authors: Park JY, Ji GY, Lee SW, Park JK, Ha D, Park Y, Cho SS, Moon SH, Shin JW, Kim DJ, Shin DA, Choi SS.

Full Source: Journal of Clinical Medicine. 2019 May 3;8(5). pii: E606. doi: 10.3390/jcm8050606.

As 2'FL appears to modulate enteric nervous system dependent motility, the authors wondered if the oligosaccharide could reverse the effects of prior restraint stress, *ex vivo*.

Restraint stress induced gut dysmotility is diminished by a milk oligosaccharide (2'-fucosyllactose) *in vitro*

2019-07-29

Stress causes severe dysmotility in the mammalian gut. Almost all research done to date has concentrated on prevention of stress-induced altered gut motility but not on treatment. The authors have previously shown that intraluminal 2'FL could acutely moderate propulsive motility in isolated mouse colonic segments. Because 2'FL appeared to modulate enteric nervous system dependent motility, the authors wondered if the oligosaccharide could reverse the effects of prior restraint stress, *ex vivo*. The authors tested whether 2'FL could benefit the dysmotility of

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isolated jejunal and colonic segments from animals subjected to prior acute restraint stress. Jejunal and colonic segments were obtained from male Swiss Webster mice that were untreated or subjected to 1 hour of acute restraint stress. Segments were perfused with Krebs buffer and propagating contractile clusters (PCC) digitally video recorded. 2'FL or β -lactose were added to the perfusate at a concentration of 1 mg/ml. Spatiotemporal maps were constructed from paired before and after treatment recordings, each consisting of 20 min duration and PCC analysed for frequency, velocity and amplitude. Stress decreased propulsive motility in murine small intestine while increasing it in the colon. 2'FL in jejunum of previously stressed mice produced a 50% increase in PCC velocity ($p = 0.0001$), a 43% increase in frequency ($p = 0.0002$) and an insignificant decrease in peak amplitude. For stressed colon, 2'FL reduced the frequency by 23% ($p = 0.017$) and peak amplitude by 26% ($p = 0.011$), and was without effect on velocity. β -lactose had negligible or small treatment effects. It was shown that the prebiotic 2'FL may have potential as a treatment for acute stress-induced gut dysmotility, ex vivo, and that, as is the case for certain beneficial microbes, the mechanism occurs in the gut, likely via action on the enteric nervous system.

Authors: Farhin S, Wong A, Delungahawatta T, Amin JY, Bienenstock J, Buck R, Kunze WA.

Full Source: PLoS One. 2019 Apr 24;14(4):e0215151. doi: 10.1371/journal.pone.0215151. eCollection 2019

OCCUPATIONAL RESEARCH

Genetic polymorphisms, mRNA expression levels of telomere-binding proteins, and associates with telomere damage in PAHs-Exposure workers

2019-07-29

Coke oven emissions (COEs), confirmed human carcinogens, are mainly composed of polycyclic aromatic hydrocarbons (PAHs). Telomere shortening in blood leukocytes has been associated with COEs, and polymorphisms in metabolic enzymes. However, the relationship between polymorphisms in telomere related genes and telomere shortening in COEs exposed workers has never been evaluated. Therefore, the authors measured telomere length and mRNA expression levels of telomere-binding proteins (TBPs) by qPCR method in leucocyte from 544 COEs exposed workers and 238 office staffs (referents). Flight mass

The authors measured telomere length and mRNA expression levels of telomere-binding proteins (TBPs) by qPCR method in leucocyte from 544 coke oven exposed workers.

spectrometry was used to perform the genotyping of selected functional and susceptible SNPs. The results showed that the telomere length in the exposure group 0.75(0.51,1.08) was significantly shorter than that in the control group 1.05(0.76,1.44) ($P < 0.001$). The mRNA expression levels of TPP1, TERF1 and TERF2 genes in the exposure group were significantly lower than those in the control group ($P < 0.05$), the mRNA expression level of POT1 in the exposure group was significantly higher than that in the control group ($P < 0.05$). The wild homozygous genotype was used as a reference, subjects carrying TERT rs2736109 AA, TERT rs3215401 CC and TERT rs2736100 GT + GG genotypes had significantly longer telomere length in the exposure group ($P < 0.05$). In conclusion, the workers exposed to COEs had shorter telomere length, which was regulated by the TPP1, TERF1, TERF2 and POT1 genes expression levels, and the gene polymorphisms of TERT gene were associated with the telomere length among PAHs-exposure workers.

Authors: Duan X, Yang Y, Zhang D, Wang S, Feng X, Wang T, Wang P, Ding M, Zhang H, Liu B, Wei W, Yao W, Cui L, Zhou X, Wang W.

Full Source: Chemosphere. 2019 Sep; 231:442-449. doi: 10.1016/j.chemosphere.2019.05.134. Epub 2019 May 19.

Occupational radiation exposure to the head is higher for scrub nurses than cardiologists during cardiac angiography

2019-07-29

This study aimed to compare the head dose of a cardiologist to scrub and scout nurses during cardiac angiography. A correlational longitudinal quantitative design was used to examine the relationship between the variable of occupational dose to the medical operator when compared with the dose to the scrub and scout nurse. A quantitative analysis was performed on data collected during coronary angiograms (N=612) for one cardiologist and 22 nurses performing either the scrub or scout role between May 2015 - February 2017. Analysis was based on log-transformed dose levels and reported as geometric means and associated 95% confidence intervals. It was found that scrub nurses received on average 41% more head dose than the cardiologist during diagnostic procedures and 52% higher doses during interventional cases. The authors concluded that nurses working in fluoroscopic cardiovascular procedures should be provided with appropriate training and protective equipment, notably lead skull caps, to minimise their occupational radiation exposure. There is a notable lack of research evaluating the occupational head and eye exposure to nurses involved in fluoroscopic procedures. This study found that during diagnostic coronary angiograms, the scrub nurses

This study aimed to compare the head dose of a cardiologist to scrub and scout nurses during cardiac angiography.

received 41% more occupational head dose than the cardiologist and 52% higher head doses during interventional cases. Radial access resulted in higher doses to scrub nurses than femoral artery access. It is advisable that staff wear protective lead glasses and skull caps and use appropriately positioned ceiling mounted lead shields to minimise the risk of adverse effects of occupational exposure to ionising radiation.

Authors: Wilson-Stewart K, Hartel G, Fontanarosa D.

Full Source: Journal of Advanced Nursing. 2019 May 29. doi: 10.1111/jan.14085. [Epub ahead of print]

Saliva cortisol level as a strain parameter for crews aboard merchant ships

2019-07-29

Seafarers working in maritime settings are affected by a great number of psychosocial stressors. The testing of cortisol in saliva is a well-established method for judging the individual strain. Therefore, this study aims to assess the crews' strain on container ships on the basis of this parameter, taking occupational groups and the three voyage episodes of the vessel into account (stay at port, river passage and sea passage). One scientist accompanied 22 sea voyages and examined 304 crew members who had provided a minimum of 5 saliva samples from at least one day. Altogether, 4,073 saliva samples were collected. An evaluation of stress hormones was conducted by analysing on the basis of groups and day profiles. The present study revealed that the average concentration of cortisol in the saliva of the examined seafarers was lower during the first hour after waking up than that of a healthy reference population. There were significant differences in the cortisol between nautical officers, deck ratings, and engine room personnel with decreasing levels ($p < .001$). Furthermore, the highest cortisol level was measured during port stay followed by sea passages and river passages ($p = .002$). After adjustment, the average level of cortisol in saliva of the whole study group was positively associated with acute shipboard stressors, namely the average current working time ($p = .050$) and the average number of terminals that had been served during the last 7 days ($p = .008$). In contrast, no association of saliva cortisol was observed with age ($p = .130$), smoking status ($p = .436$), the current stay on board of the vessel ($p = .230$) or with the subjective stress evoked by noise, vibration, ship motion or psychophysical demands on board. Only the deck ratings and the engine room personnel displayed a continuous decrease in the cortisol level in the daily profile ($p < .001$). In total, the present study revealed an association of the saliva cortisol level among the examined crew with acute shipboard stressors, the working

This study aims to assess the crews' strain on container ships by measuring cortisol in saliva.

group, and the ship's voyage episode. A reliable collection of samples over several days on board is well possible through the presence of a specially trained person on site. In maritime studies, this high level of personal effort seems to be inevitable in order to allow a differentiated judgement of the hormone stress reaction of seafarers and meet high quality standards.

Authors: Oldenburg M, Jensen HJ.

Full Source: Chronobiology International. 2019 Jul;36(7):1005-1012. doi: 10.1080/07420528.2019.1604540. Epub 2019 May 6.

First aid therapy for corrosive chemical eye burns: results of a 30-year longitudinal study with two different decontamination concepts

2019-07-29

There is currently uncertainty about the most efficacious decontamination solution for corrosive chemical eye burns. This 30-year longitudinal study evaluated the relative efficacy of two different decontamination methods. Passive decontamination consists of rinsing with tap water, 0.9% normal saline, isotonic buffered phosphate solution, or Ringer's lactate. Active decontamination adds an amphoteric, polyvalent, and chelating component with Previn® (Diphoterine®) solution (Laboratoire Prevor, Valmondois, France). A prospective evaluation of patients treated in two specialised eye clinics for eye burns was begun in 1988. Recorded data included exposure circumstances, type of corrosive, different types of first therapy, and clinical treatment and outcome. Patients were treated from clinic admission and up to 24 h after the corrosive chemical burn with rinsing for 15 min using two different protocols. From 1988 to 2005, sterile 0.9% normal saline or Ringer's lactate was used. Since 2006, sterile, hypertonic, amphoteric Previn® solution was used. Comparative statistical analysis was done with the Fisher contingency tables and Wilcoxon tests. There were a total of 1495 patients with 2194 chemically burned eyes. In 1988-2005, the annual incidence was 66.1/year; in 2006-2017, it was 65.5/year. Similar incidences were noted when initial rinsing was with tap water or isotonic buffered phosphate solutions. There was a significantly more severe outcome of corrosive chemical eye burns with any first aid rinsing solutions other than Previn® solution or tap water was used ($p < 0.001$). Previn® solution or tap water rinsing in the pre-hospital setting and secondary rinsing with Previn® solution in the hospital decreased lesion severity in comparison with all other rinsing solutions ($p < 0.001$). The frequency of corrosive chemical eye burns was comparatively high despite tightening of occupational health and safety regulations over

the past 30 years. The severity of corrosive chemical eye burns has been dramatically decreased since the introduction of Previn® solution for initial and secondary rinsing. A new protocol for immediate Previn® solution use by the Cologne Fire Brigade and secondary Previn® solution rinsing in hospital has reduced the frequency of severe corrosive chemical eye burns to less than 60% as compared to the period of 1988-2005 when other rinsing solutions were utilised.

Authors: Wiesner N, Dutescu RM, Uthoff D, Kottek A, Reim M, Schrage N.
Full Source: Graefe's Archive for Clinical and Experimental Ophthalmology. 2019 May 30. doi: 10.1007/s00417-019-04350-x. [Epub ahead of print]

Trends in the Control Strategies for Occupational Exposure to Carcinogenic, Mutagenic, and Reprotoxic Chemicals in France (2003-2010)

2019-07-29

European directives stipulate that French employers take all available measures to reduce the use of carcinogenic, mutagenic, and reprotoxic (CMR) chemicals. The present study explores the trends for the various control measures that are available to employees exposed to CMR agents, at two time points (2003 and 2010). This study assessed data from the 2003 and the 2010 French national cross-sectional survey of occupational hazards (SUMER). The availability of collective protections (source-based controls and general ventilation) and personal protective equipment (PPE) was explored. Trends in the availability of protective measures were studied using multilevel logistic regressions. Exposure situations without any protective measures decreased considerably between 2003 and 2010 (29.9% versus 17.9%, respectively). The increase in the proportion of exposure situations involving source-based controls (e.g. an isolation chamber and local exhaust ventilation) was, however, much less. Multiple regression analysis showed that the protection strategies depended on the job characteristics (e.g. work schedules, the employment contract, and the occupation) as well as the size of the company. There were noticeable changes between 2003 and 2010. For example, differences in protections available between full-time and part-time workers disappeared in the 7-year period, whereas those between executives/managers and other employees increased, as did the gaps between large and small companies. Although the overall increase in exposure situations involving protective measures masks a number of differences in exposure between employee categories, it is a step in the right direction. Source-based controls appeared to be implemented more for exposures with the longest

The present study explores the trends for the various control measures that are available to employees exposed to carcinogenic, mutagenic, and reprotoxic agents.

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durations, and PPE was very often combined with collective protections, which is what is currently recommended.

Authors: Havet N, Penot A, Plantier M, Morelle M, Fervers B, Charbotel B.

Full Source: Annals in Work Exposure & Health. 2019 May 21;63(5):488-504.

doi: 10.1093/annweh/wxz021.

PUBLIC HEALTH RESEARCH

Exposure to phthalates and bisphenol A is associated with higher risk of cardiometabolic impairment in normal weight children

2019-07-29

Some obese individuals have normal metabolic profile, and some normal-weight persons have impaired metabolic status. The authors hypothesise that one of the potential underlying factors for such differences in cardiometabolic profiles might be the exposure to some environmental chemicals. This study aimed to investigate the association of serum bisphenol A (BPA) and phthalate metabolites with cardiometabolic risk factors in children and adolescents independent of their weight status. This case-control study was conducted on a subsample of 320 participants of a national school-based surveillance program in Iran. Serum BPA and phthalate metabolites were measured by gas chromatography mass spectrophotometry. The authors compared them in children and adolescents with and without excess weight and those with and without cardiometabolic risk factors (80 in each group). The concentrations of chemicals to tertiles were categorised and applied to logistic regression models after adjustment for potential confounding factors. The concentrations of BPA and some metabolites of phthalates were significantly different in the four groups studied. MEHP concentration was associated with higher odds ratio of cardiometabolic risk factors in participants with normal weight (OR, 95% CI 2.82, 1.001-7.91) and those with excess weight (OR, 95% CI 3.15, 1.27-7.83). MBP concentration increased the odds ratio of cardiometabolic risk factors only in normal weight children and adolescents (OR, 95% CI 6.59, 2.33-18.59, $P < 0.001$). In participants without cardiometabolic risk factor, MMP and MEHHP were significantly associated with increased risk of excess weight (OR, 95% CI 5.90, 1.21-28.75 and 7.82, 1.5-41.8, respectively). This study showed that the association of BPA and phthalate with cardiometabolic risk factors is independent of the weight status. These findings suggest that the metabolic impairment in some normal weight children and normal

This study aimed to investigate the association of serum bisphenol A (BPA) and phthalate metabolites with cardiometabolic risk factors in children and adolescents independent of their weight status.

metabolic profile of some obese children can be, in part, related to exposure to these environmental chemicals.

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Initiation and completion rates of isoniazid preventive therapy among people living with HIV in Far-Western Region of Nepal: a retrospective cohort study

2019-07-29

Isoniazid preventive therapy (IPT), for people living with HIV (PLHIV) is the proven and recommended intervention to avert tuberculosis (TB). In 2015, Nepal implemented 6 months of IPT for all PLHIV registered for HIV care in antiretroviral therapy (ART) centres. After programmatic implementation, there has been no systematic assessment of IPT initiation and completion rates among PLHIV. In this study, the authors aimed to assess IPT initiation and completion rates in the Far-Western Region (FWR) of Nepal. A retrospective cohort study was conducted using secondary data extracted from registers maintained at ART centres. All PLHIV registered for care between January 2016 and December 2017 in 11 ART centres were enrolled in the study. IPT initiation and completion rates were summarised as percentages with 95% CI. Independent association between patient characteristics and non-initiation of IPT was assessed using cluster-adjusted generalised linear model (log binomial regression) and adjusted relative risk (RR) with 95% CI was calculated. Of the 492 PLHIV included, 477 (97.0%) did not have active TB at registration. Among 477 without active TB, 141 (29.8%, 95% CI 25.7% to 34.1%) had been initiated on IPT and 85 (17.8%) were initiated within 3 months of registration. Of 141 initiated on IPT, 133 (94.3%, 95% CI 89.1% to 97.5%) had completed 6 months of IPT. Being more than 60 years of age (RR-1.3, 95% CI 1.1 to 1.7), migrant worker (RR-1.3, 95% CI 1.1 to 1.4) and not being initiated on ART (RR-1.4, 95% CI 1.1 to 1.8) were significantly associated with IPT initiation. In FWR of Nepal, three out of 10 eligible PLHIV had received IPT. Among those who have received IPT, the completion rate was good. The HIV care program needs to explore the potential reasons for this low coverage and take context specific corrective action to fix this gap.

Authors: Dhungana GP, Thekkur P, Chinnakali P, Bhatta U, Pandey B, Zhang WH.

Full Source: BMJ Open. 2019 May 29;9(5):e029058. doi: 10.1136/bmjopen-2019-029058.

In this study, the authors aimed to assess IPT initiation and completion rates in the Far-Western Region (FWR) of Nepal.

Heightened susceptibility: A review of how pregnancy and chemical exposures influence maternal health

2019-07-29

Pregnancy is a unique period when biological changes can increase sensitivity to chemical exposures. Pregnant women are exposed to multiple environmental chemicals via air, food, water, and consumer products, including flame retardants, plasticisers, and pesticides. Lead exposure increases risk of pregnancy-induced hypertensive disorders, although women's health risks are poorly characterised for most chemicals. Research on prenatal exposures has focused on foetal outcomes and less on maternal outcomes. In the present study, the authors reviewed epidemiologic literature on chemical exposures during pregnancy and three maternal outcomes: preeclampsia, gestational diabetes, and breast cancer. It was found that pregnancy can heighten susceptibility to environmental chemicals and women's health risks, although variations in study design and exposure assessment limited study comparability. Future research should include pregnancy as a critical period for women's health. Incorporating biomarkers of exposure and effect, deliberate timing and method of measurement, and consistent adjustment of potential confounders would strengthen research on the exposome and women's health.

Authors: Varshavsky J, Smith A, Wang A, Hom E, Izano M, Huang H, Padula A, Woodruff TJ.

Full Source: Reproductive Toxicology. 2019 May 2. pii: S0890-6238(18)30434-9. doi: 10.1016/j.reprotox.2019.04.004. [Epub ahead of print]

Clothing-Mediated Exposures to Chemicals and Particles

2019-07-29

A growing body of evidence identifies clothing as an important mediator of human exposure to chemicals and particles, which may have public health significance. This study reviews and critically assesses the state of knowledge regarding how clothing, during wear, influences exposure to molecular chemicals, abiotic particles, and biotic particles, including microbes and allergens. The underlying processes that govern the acquisition, retention, and transmission of clothing-associated contaminants and the consequences of these for subsequent exposures are explored. Chemicals of concern have been identified in clothing, including by-products of their manufacture and chemicals that adhere to clothing during use and care. Analogously, clothing acts as a reservoir for biotic and abiotic particles acquired from occupational and environmental

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sources. Evidence suggests that while clothing can be protective by acting as a physical or chemical barrier, clothing-mediated exposures can be substantial in certain circumstances and may have adverse health consequences. This complex process is influenced by the type and history of the clothing; the nature of the contaminant; and by wear, care, and storage practices. Future research efforts are warranted to better quantify, predict, and control clothing-related exposures.

Authors: Licina D, Morrison GC, Bekö G, Weschler CJ, Nazaroff WW.

Full Source: Environmental Science & Technology. 2019 May

21;53(10):5559-5575. doi: 10.1021/acs.est.9b00272. Epub 2019 May 9.

The Role of Socioeconomic Status in the Association of Lung Function and Air Pollution-A Pooled Analysis of Three Adult ESCAPE Cohorts

2019-07-29

Ambient air pollution is a leading environmental risk factor and its broad spectrum of adverse health effects includes a decrease in lung function. Socioeconomic status (SES) is known to be associated with both air pollution exposure and respiratory function. This study assesses the role of SES either as confounder or effect modifier of the association between ambient air pollution and lung function. Cross-sectional data from three European multicentre adult cohorts were pooled to assess factors associated with lung function, including annual means of home outdoor NO₂. Pre-bronchodilator lung function was measured according to the ATS-criteria. Multiple mixed linear models with random intercepts for study areas were used. Three different factors (education, occupation and neighbourhood unemployment rate) were considered to represent SES. NO₂ exposure was negatively associated with lung function. Occupation and neighbourhood unemployment rates were not associated with lung function. However, the inclusion of the SES-variable education improved the models and the air pollution-lung function associations got slightly stronger. NO₂ associations with lung function were not substantially modified by SES-variables. In this multicentre European study, the authors could show that SES plays a role as a confounder in the association of ambient NO₂ exposure with lung function.

Authors: Keidel D, Anto JM, Basagaña X, Bono R, Burte E, Carsin AE, Forsberg B, Fuertes E, Galobardes B, Heinrich J, de Hoogh K, Jarvis D, Künzli N, Leynaert B, Marcon A, Le Moual N, de Nazelle A, Schindler C, Siroux V,

This study assesses the role of socioeconomic status either as confounder or effect modifier of the association between ambient air pollution and lung function.