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### ENVIRONMENTAL RESEARCH

#### Methylmercury Determination in Fish by Direct Mercury Analyser

2019-11-19

There are two methods for quantifying methylmercury (MeHg) in fish using GC-electron capture detection (ECD): AOAC INTERNATIONAL Official Method 988.11 and the Korean Food Code (KFC) method. Both of these methods consume a large amount of chemicals and require long pre-treatment times because of several complicated MeHg extraction steps. In this study, a new method for the simple and rapid determination of MeHg in fish has been developed. The method is based on the investigation of oxygen combustion-gold amalgamation using a direct mercury analyser (DMA) after the complete removal of MeHg by organic extraction and back-extraction to an aqueous medium. Methods: The DMA is suitable for the analysis of both solid and liquid materials and has a good detection limit. The developed method was validated by comparing the MeHg recoveries (%) of both certified reference materials and the market-purchased fish samples with the MeHg concentration obtained using the KFC method. The following parameters pertaining to the developed method were established: detection limit, 1.02 µg/kg; LOQ, 3.09 µg/kg; linearity ( $r$ ), 0.9998; range, 0.1-300 µg/kg; and recovery, 95-97%. The authors concluded that the new method is a promising alternative by virtue of its much simpler and faster sample pre-treatment procedure, with a MeHg recovery as high as that of the KFC method. The developed method enables the simultaneous analysis of total Hg and MeHg with only DMA equipment.

Authors: Kim TH, Cho MJ, Lee Y, Kim JH, Hwang JY, Lee HE, Kim SH, Choi JD, Kang GJ.

Full Source: Journal of AOAC International. 2019 Sep 19. doi: 10.5740/jaoacint.18-0254. [Epub ahead of print]

In this study, a new method for the simple and rapid determination of MeHg in fish has been developed.

#### Acanthamoeba in Southeast Asia - Overview and Challenges

2019-11-19

Acanthamoeba, one of free-living amoebae (FLA), remains a high risk of direct contact with this protozoan parasite which is ubiquitous in nature and man-made environment. This pathogenic FLA can cause sight-threatening amoebic keratitis (AK) and fatal granulomatous amoebic encephalitis (GAE) though these cases may not commonly be reported

in our clinical settings. *Acanthamoeba* has been detected from different environmental sources namely; soil, water, hot-spring, swimming pool, air-conditioner, or contact lens storage cases. The identification of *Acanthamoeba* is based on morphological appearance and molecular techniques using PCR and DNA sequencing for clinico-epidemiological purposes. Recent treatments have long been ineffective against *Acanthamoeba* cyst, novel anti-*Acanthamoeba* agents have therefore been extensively investigated. There are efforts to utilise synthetic chemicals, lead compounds from medicinal plant extracts, and animal products to combat *Acanthamoeba* infection. Applied nanotechnology, an advanced technology, has shown to enhance the anti-*Acanthamoeba* activity in the encapsulated nanoparticles leading to new therapeutic options. This review attempts to provide an overview of the available data and studies on the occurrence of pathogenic *Acanthamoeba* among the Association of Southeast Asian Nations (ASEAN) members with the aim of identifying some potential contributing factors such as distribution, demographic profile of the patients, possible source of the parasite, mode of transmission and treatment. Further, this review attempts to provide future direction for prevention and control of the *Acanthamoeba* infection.

Authors: Bunsuwansakul C, Mahboob T, Hounkong K, Laohaprapanon S, Chitapornpan S, Jawjit S, Yasiri A, Barusrux S, Bunluepuech K, Sawangjaroen N, Salibay CC, Kaewjai C, Pereira ML, Nissapatorn V.  
Full Source: Korean Journal of Parasitology. 2019 Aug;57(4):341-357. doi: 10.3347/kjp.2019.57.4.341. Epub 2019 Aug 31.

### Mussel-Inspired Fabrication of SERS Swabs for Highly Sensitive and Conformal Rapid Detection of Thiram Bactericides

2019-11-19

As an important sort of dithiocarbamate bactericide, thiram has been widely used for fruits, vegetables and mature crops to control various fungal diseases; however, the thiram residues in the environment pose a serious threat to human health. In this study, silver nanoparticles (AgNPs) were grown in-situ on cotton swab (CS) surfaces, based on the mussel-inspired polydopamine (PDA) molecule and designed as highly sensitive surface-enhanced Raman scattering (SERS) swabs for the conformal rapid detection of bactericide residues. With this strategy, the obtained CS@PDA@AgNPs swabs demonstrated highly sensitive and reproducible Raman signals toward Nile blue A (NBA) probe molecules, and the detection limit was as low as  $1.0 \times 10^{-10}$  M. More critically, these CS@PDA@AgNPs swabs could be served as flexible SERS substrates for

In this study, silver nanoparticles (AgNPs) were grown in-situ on cotton swab (CS) surfaces, based on the mussel-inspired polydopamine (PDA) molecule and designed as highly sensitive surface-enhanced Raman scattering (SERS) swabs for the conformal rapid detection of bactericide residues.

the conformal rapid detection of thiram bactericides from various fruit surfaces through a simple swabbing approach. The results showed that the detection limit of thiram residues from pear, grape and peach surfaces was approximately down to the level of 0.12 ng/cm<sup>2</sup>, 0.24 ng/cm<sup>2</sup> and 0.15 ng/cm<sup>2</sup> respectively, demonstrating a high sensitivity and excellent reliability toward dithiocarbamate bactericides. Not only could these SERS swabs significantly promote the collection efficiency of thiram residues from irregular shaped matrices, but they could also greatly enhance the analytical sensitivity and reliability, and would have great potential for the on-site detection of residual bactericides in the environment and in bioscience fields.

Authors: Liu J, Si T, Zhang L, Zhang Z.

Full Source: *Nanomaterials* (Basel). 2019 Sep 17;9(9). pii: E1331. doi: 10.3390/nano9091331.

### Biodegradation of phenol in saline or hypersaline environments by bacteria: A review

2019-11-19

With the continuous demand from industry for chemical raw materials, a large amount of high-salinity wastewater containing phenol is discharged into the aquatic environment, and the leakage of dangerous chemicals into the sea may lead to phenol pollution of the ocean. Phenol is a common chemical posing serious environmental hazard. Biodegradation is an effective, low-cost, environment-friendly method of removing phenol from water, but in hypersaline environments, traditional freshwater organisms are less efficacious. In this study, at least 17 genera of bacteria from three phyla are found that can degrade phenol in different saline environments. The sources and taxonomy of halotolerant and halophilic bacteria are reviewed. Moreover, the pathway of phenol removal, kinetics of biodegradation, influencing factors, and recent treatment processes of wastewater are discussed.

Authors: Li H, Meng F, Duan W, Lin Y, Zheng Y.

Full Source: *Ecotoxicology & Environmental Safety*. 2019 Nov 30; 184:109658. doi: 10.1016/j.ecoenv.2019.109658. Epub 2019 Sep 11.

### MEDICAL RESEARCH

#### Src inhibition attenuates polyglutamine-mediated neuromuscular degeneration in spinal and bulbar muscular atrophy

2019-11-19

Spinal and bulbar muscular atrophy (SBMA) is a neuromuscular disease caused by an expanded CAG repeat in the androgen receptor (AR) gene. In the present study, the authors perform a comprehensive analysis of signalling pathways in a mouse model of SBMA (AR-97Q mice) utilising a phosphoprotein assay. The authors measure the levels of 17 phosphorylated proteins in spinal cord and skeletal muscle of AR-97Q mice at three stages. The level of phosphorylated Src (p-Src) is markedly increased in the spinal cords and skeletal muscles of AR-97Q mice prior to the onset. Intraperitoneal administration of a Src kinase inhibitor improves the behavioural and histopathological phenotypes of the transgenic mice. p130Cas was identified as an effector molecule of Src and show that the phosphorylated p130Cas is elevated in murine and cellular models of SBMA. These results suggest that Src kinase inhibition is a potential therapy for SBMA.

Authors: Iida M, Sahashi K, Kondo N, Nakatsuji H, Tohno G, Tsutsumi Y, Noda S, Murakami A, Onodera K, Okada Y, Nakatochi M, Tsukagoshi Okabe Y, Shimizu S, Mizuno M, Adachi H, Okano H, Sobue G, Katsuno M.

Full Source: Nature Communication. 2019 Sep 19;10(1):4262. doi: 10.1038/s41467-019-12282-7.

In the present study, the authors perform a comprehensive analysis of signalling pathways in a mouse model of SBMA (AR-97Q mice) utilising a phosphoprotein assay.

#### Which chemicals should be grouped together for mixture risk assessments of male reproductive disorders?

2019-11-19

There is concern about cumulative exposures to compounds that disrupt male sexual differentiation in foetal life, leading to irreversible effects in adulthood, including declines in semen quality, testes non-descent, malformations of the penis and testis cancer. Traditional chemical-by-chemical risk assessment approaches cannot capture the likely cumulative health risks. Past efforts of focusing on combinations of phthalates, a subgroup of chemicals suspected of contributing to these risks, do not go far enough, as they ignore the contribution of other types of chemicals. With the aim of providing criteria for the inclusion of additional chemicals in mixture risks assessments for male reproductive health, this paper examines the mechanisms of action of various chemicals capable of

disrupting male sexual differentiation. An Adverse Outcome Pathway (AOP) network for malformations of the male reproductive system is constructed that includes new findings about the role of disruptions of prostaglandin signalling. This network is used to identify pathways that converge at critical nodal points to produce down-stream adverse effects. From this knowledge, combinations of chemicals with different mechanisms of action are predicted that should result in cumulative effects. These predictions are then mapped against evidence from experimental mixture studies with relevant combinations. From the outcome of this analysis it is concluded that cumulative assessment groups for male reproductive health risks should not only include phthalates but also comprise androgen receptor (AR) antagonists, chemicals capable of disrupting steroid synthesis, InsL3 production, prostaglandin signalling and co-planar polychlorinated dibenzo-dioxins together with other dioxin-like compounds. This list goes far beyond what has been suggested previously. A minimum set of chemicals to be assessed together with phthalates includes pesticides such as vinclozolin, prochloraz, procymidone, linuron, the pain killers paracetamol, aspirin and ibuprofen, pharmaceuticals such as finasteride, ketoconazole, and the lipid-lowering drug simvastin, poly-chlorinated dibenzo-dioxins and other dioxin-like pollutants and phenolics such as bisphenol A and butylparaben. AOP network analyses are essential to overcome difficulties in establishing groupings of chemicals for mixture risk assessments that derive from a narrow focus on mechanisms and modes of action.

Author: Kortenkamp A.

Full Source: *Molecular & Cellular Endocrinology*. 2019 Sep 13; 499:110581. doi: 10.1016/j.mce.2019.110581. [Epub ahead of print]

### Analgesic effect of resveratrol on colitis-induced visceral pain via inhibition of TRAF6/NF- $\kappa$ B signalling pathway in the spinal cord

2019-11-19

Visceral pain is a complex and common symptom of inflammatory bowel disease (IBD) patients. Developing novel efficient therapeutics is still a common interest for clinicians. Increasing evidence have shown that tumour necrosis factor (TNF) receptor associated factor 6 (TRAF6) contributes to the pathological pain state in some pain models. Resveratrol (RSV) has showed promising potential for the treatment of neuropathic pain and inflammatory pain. However, whether RSV has analgesic effect on visceral pain and the underlying mechanisms remain unclear. In this study, the authors established the colitis model

In this study, the authors established the colitis model through intrarectal administration of 2,4,6-trinitrobenzene sulfonic acid (TNBS), and found that TNBS induced colonic inflammation and visceral hypersensitivity.

through intrarectal administration of 2,4,6-trinitrobenzene sulfonic acid (TNBS), and found that TNBS induced colonic inflammation and visceral hypersensitivity. Meanwhile, astroglial marker glial fibrillary acidic protein (GFAP), TRAF6, phosphorylation of NF- $\kappa$ B (pNF- $\kappa$ B), tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) and interleukin-1 $\beta$  (IL-1 $\beta$ ) levels were increased in L6-S1 spinal cord after TNBS enema. Then, intrathecal injection of TRAF6 siRNA attenuated visceral pain, blocked the upregulation of pNF- $\kappa$ B, TNF- $\alpha$  and IL-1 $\beta$  levels in the spinal cord in TNBS mice. Furthermore, spinal administration of NF- $\kappa$ B inhibitor, BAY11-7082 reversed the pain behaviour and suppressed spinal TNF- $\alpha$  and IL-1 $\beta$  expression in TNBS mice. Finally, repeated intrathecal injection of RSV reversed TNBS-induced visceral pain hypersensitivity in a dose-dependent manner. Meanwhile, TNBS-induced enhancement of spinal GFAP, TRAF6, pNF- $\kappa$ B, TNF- $\alpha$  and IL-1 $\beta$  were reduced by the same treatment of RSV. In conclusion, our results suggest that RSV exerts the effects of antinociception on colitis-induced visceral hyperalgesia through inhibition of spinal TRAF6/NF- $\kappa$ B signalling pathway and the production of inflammatory mediators in the spinal cord, suggesting a new application of RSV for the treatment of visceral pain.

Authors: Lu Y, Xu HM, Han Y, Zhang YL.

Full Source: Brain Research. 2019 Dec 1; 1724:146464. doi: 10.1016/j.brainres.2019.146464. Epub 2019 Sep 16.

### Silymarin in non-cirrhotics with non-alcoholic steatohepatitis: A randomised, double-blind, placebo-controlled trial

2019-11-19

The botanical product silymarin, an extract of milk thistle, is commonly used by patients to treat chronic liver disease and may be a treatment for NASH due to its antioxidant properties. The authors aimed to assess the safety and efficacy of higher than customary doses of silymarin in non-cirrhotic patients with NASH. This exploratory randomised double-blind placebo controlled multicentre Phase II trial tested a proprietary standardised silymarin preparation (Legalon<sup>®</sup>, Rottapharm|Madaus, Mylan) and was conducted at 5 medical centres in the United States. Eligible adult patients had liver biopsy within 12 months showing NASH without cirrhosis with NAFLD Activity Score (NAS)  $\geq$ 4 per site pathologist's assessment. Participants were randomized to Legalon<sup>®</sup> 420 mg, 700 mg, or placebo t.i.d. for 48 weeks. The primary endpoint was histological improvement  $\geq$ 2 points in NAS. Of 116 patients screened, 78 were randomized. There were no significant differences in adverse events among the treatment groups. After 48-50 weeks, 4/27 (15%) in

The authors aimed to assess the safety and efficacy of higher than customary doses of silymarin in non-cirrhotic patients with NASH.

the 700 mg dose, 5/26 (19%) participants randomised to 420 mg, and 3/25 (12%) of placebo recipients reached the primary endpoint ( $p = 0.79$ ) among all randomised participants, indicating no benefit from silymarin in the intention to treat analysis. Review by a central pathologist demonstrated that a substantial number of participants (49, 63%) did not meet histological entry criteria and that fibrosis stage improved most in the placebo treated group, although not significantly different from other groups. Silymarin (Legalon®) at the higher than customary doses tested in this study is safe and well tolerated. The effect of silymarin in patients with NASH remains inconclusive due to the substantial number of patients who entered the study but did not meet entry histological criteria, the lack of a statistically significant improvement in NAS of silymarin treated patients, and the unanticipated effect of placebo on fibrosis indicate the need for additional clinical trials.

Authors: Navarro VJ, Belle SH, D'Amato M, Adfhal N, Brunt EM, Fried MW, Reddy KR, Wahed AS, Harrison S; Silymarin in NASH and C Hepatitis (SyNCH) Study Group.

Full Source: PLoS One. 2019 Sep 19;14(9):e0221683. doi: 10.1371/journal.pone.0221683. eCollection 2019.

### Assessment of the Dose-Response Relationship Between Folate Exposure and Cognitive Impairment: Synthesizing Data from Documented Studies.

2019-11-19

The dose-response relationship between folate levels and cognitive impairment among individuals with vitamin B12 deficiency is an essential component of a risk-benefit analysis approach to regulatory and policy recommendations regarding folic acid fortification. Epidemiological studies provide data that are potentially useful for addressing this research question, but the lack of analysis and reporting of data in a manner suitable for dose-response purposes hinders the application of the traditional evidence synthesis process. This study aimed to estimate a quantitative dose-response relationship between folate exposure and the risk of cognitive impairment among older adults with vitamin B12 deficiency using "probabilistic meta-analysis," a novel approach for synthesising data from observational studies. Second-order multistage regression was identified as the best-fit model for the association between the probability of cognitive impairment and serum folate levels based on data generated by randomly sampling probabilistic distributions with parameters estimated based on summarised information reported in relevant publications. The findings indicate a "J-shape" effect of serum

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folate levels on the occurrence of cognitive impairment. In particular, an excessive level of folate exposure is predicted to be associated with a higher risk of cognitive impairment, albeit with greater uncertainty than the association between low folate exposure and cognitive impairment. This study directly contributes to the development of a practical solution to synthesise observational evidence for dose-response assessment purposes, which will help strengthen future nutritional risk assessments for the purpose of informing decisions on nutrient fortification in food.

Authors: Wang B, Sahyoun NR, Shao K, Dutta E, Clarke J.

Full Source: Risk Analysis. 2019 Sep 19. doi: 10.1111/risa.13404. [Epub ahead of print]

### Real-world effectiveness of umeclidinium/vilanterol versus fluticasone propionate/salmeterol as initial maintenance therapy for chronic obstructive pulmonary disease (COPD): a retrospective cohort study

2019-11-19

Retrospective claims data in patients with chronic obstructive pulmonary disease (COPD) initiating maintenance therapy with inhaled fixed-dose combinations of long-acting muscarinic antagonist/long-acting  $\beta_2$ -agonist (LAMA/LABA) versus inhaled corticosteroid (ICS)/LABA have not been reported. Retrospective observational study in a COPD-diagnosed population of commercial and Medicare Advantage with Part D (MAPD) enrollees aged  $\geq 40$  years from a US health insurer database. Patients initiated umeclidinium/vilanterol (UMEC/VI [62.5/25  $\mu\text{g}$ ]) or fluticasone propionate/salmeterol (FP/SAL [250/50  $\mu\text{g}$ ]) between April 1, 2014 and August 31, 2016 (index date) and had 12 months continuous enrolment pre- and post-index. Exclusion criteria included an asthma diagnosis in the pre-index period/index date; ICS-, LABA-, or LAMA-containing therapy during the pre-index period; or pharmacy fills for both UMEC/VI and FP/SAL, multiple-inhaler triple therapy, a non-index therapy, or COPD exacerbation on the index date. Adherence (proportion of days covered [PDC]  $\geq 80\%$ ) was modelled using weighted logistic regression following inverse probability of treatment weighting (IPTW). Weighted Kaplan-Meier and Cox proportional hazards regression following IPTW were performed for incidence of COPD exacerbation and escalation to multiple-inhaler triple therapy. The study population included 5306 patients (1386 initiating UMEC/VI and 3920 initiating FP/SAL). Adjusted odds of adherence were 2.00 times greater among UMEC/VI than FP/SAL initiators (95% confidence interval [CI]: 1.62–2.46;  $P < 0.001$ ). The adjusted hazard ratio (HR) for first exacerbation was 0.87 (95% CI: 0.74–1.01;

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P=0.067) among UMEC/VI versus FP/SAL initiators. UMEC/VI initiators had 35% lower adjusted risk of escalation to multiple-inhaler triple therapy (HR 0.65; 95% CI: 0.47-0.89; P=0.008) versus FP/SAL. On-treatment, UMEC/VI initiators had an adjusted 30% reduced risk of a first moderate/severe COPD exacerbation (HR 0.70; 95% CI: 0.54-0.90; P=0.006). Patients with COPD initiating UMEC/VI had higher adherence and longer time before escalation to multiple-inhaler triple therapy than FP/SAL initiators.

Authors: Moretz C, Sharpsten L, Bengtson LG, Koep E, Le L, Tong J, Stanford RH, Hahn B, Ray R.

Full Source: International Journal of Chronic Obstructive Pulmonary Disease. 2019 Aug 1; 14:1721-1737. doi: 10.2147/COPD.S204649. eCollection 2019.

## OCCUPATIONAL RESEARCH

### Occupational exposure to pesticides and multiple myeloma in the AGRICAN cohort

2019-11-19

Epidemiological studies have found an increased risk of multiple myeloma (MM) in farmers. Few studies have investigated the detailed circumstances of occupational pesticide exposure which could explain these increased risks (pesticide use on crops, seeds or on animals, contact with treated crops) and the role of other exposures. In the Agriculture and Cancer cohort (AGRICAN), the authors assessed the associations between MM and crop- or animal-related activities, with specific attention to pesticide exposure via use on animals and crops or contact with treated crops and to disinfectant exposure. Analyses concerned 155,192 participants, including 269 incident MM identified by cancer registries from enrolment (2005-2007) to 2013. Cox models using attained age as time scale were run to calculate hazard ratios (HR) and 95% confidence intervals (CI). MM risk was increased in farmers (i) who started using pesticides on crops in the 1960s, especially among those applying pesticides on corn ( $\geq 20$  years: HR 1.73, 95% CI 1.08, 2.78, p for trend  $< 0.01$ ) and (ii) using insecticides on animals (HR 1.48, 95% CI 1.11, 1.98), especially among horse farmers ( $\geq 10$  years: HR 2.77, 95% CI 1.22-6.27, p for trend = 0.01). The authors also observed significant elevated risks with disinfectant use in animal barns.

In the Agriculture and Cancer cohort (AGRICAN), the authors assessed the associations between MM and crop- or animal-related activities, with specific attention to pesticide exposure via use on animals and crops or contact with treated crops and to disinfectant exposure.

Findings support the role of pesticide use on crops and animals in the occurrence of MM risk in farmers.

Authors: Tual S, Busson A, Boulanger M, Renier M, Piel C, Pouchieu C, Pons R, Perrier S, Levêque-Morlais N, Karuranga P, Lemarchand C; AGRICAN-Group, Marcotullio E, Guizard AV, Monnereau A, Baldi I, Lebailly P.

Collaborators: Arveux P, Bara S, Bouvier AM, Busquet T, Colonna M, Coureau G, Delanoé M, Grosclaude P, Guizard AV, Herbrecht P, Laplante JJ, Lapotre-Ledoux B, Launoy G, Lenoir D, Marrer E, Marcotullio E, Maynadié M, Molinié F, Monnereau A, Paumier A, Jarriges J, Thibaudier JM, Troussard X, Velten M, Wavelet E, Woronoff AS.

Full Source: Cancer Causes Control. 2019 Sep 18. doi: 10.1007/s10552-019-01230-x. [Epub ahead of print]

### Protective factors that mitigate the indirect risk of combat exposure upon meaning in life: A longitudinal study of student veterans

2019-11-19

Studies of combat emphasise its impact upon health-related outcomes (e.g., depression). Little is known regarding the risk that combat poses to positive outcomes, such as meaning in life, and factors that mitigate this risk. The authors sought to investigate whether combat poses an indirect risk to life meaning and protective factors that mitigate this risk. Through an online survey at 2 time points, 153 combat-exposed veterans enrolled in college reported combat exposure, health status (posttraumatic stress disorder, depressive, somatic symptoms), meaning in life, and protective factors (social support, instructor autonomy support, coping ability, academic self-efficacy, social and community participation, and meaningful activity). Path analysis was used to (a) explore whether baseline health status and life meaning mediated the relationship between combat and follow-up life meaning, and (b) test whether protective factors promoted life meaning despite combat and health status (combat-related risk). The relationship between combat and follow-up life meaning was mediated by baseline health status and life meaning. Meaningful activity and coping ability were associated with greater life meaning independently of combat-related risk. The indirect effect of combat upon life meaning was weakened when social support, instructor autonomy support, coping ability, and academic self-efficacy were high. Combat is associated with worse health status, in turn limiting student veterans' life meaning. This supports an expanded conception of combat-related risk, in which the effect of combat upon positive outcomes is emphasised. Findings indicate that the proposed protective factors may

The authors sought to investigate whether combat poses an indirect risk to life meaning and protective factors that mitigate this risk.

mitigate combat-related risk. The authors discuss implications for research and practice.

Authors: Kinney AR, Schmid AA, Henry KL, Coatsworth JD, Eakman AM.

Full Source: Psychological Trauma. 2019 Sep 19. doi: 10.1037/tra0000512.

[Epub ahead of print]

### Small business success: Identifying safety hazards and safety risks

2019-11-19

The establishment and growth of the small businesses in South Africa is of vital importance for economic stability and progress in the economy. A key small business management skill comprises occupational health and safety management, with particular reference to the proper identification of safety hazards and safety risks. This conceptual article set out to identify current perceptions about the concepts of safety, safety risks and safety hazards in the workplace while also identifying and analysing misconceptions regarding safety hazards. This study reports on a secondary data analysis of relevant literature on safety hazards and safety risk and the role thereof on small business success. The structure and functioning of the interrelated characteristics of safety hazards were visualised, with the objective of allowing small business owners or managers to understand how safety hazards contribute to safety risks. Proper identification of safety hazards and safety risks, along with adequate protection measures, allows for improved productivity and a reduction in operational costs. Safety hazards in the workplace, encompassing the functional and structural characteristics, such as humans and machinery, should be noted by small business owners, as applicable to all types of businesses. This study may serve as a catalyst for small business success through growth and sustainability by implementing enhanced safety management practices based on an accurate identification and analysis of safety hazards and safety risks. It allows for the identification and proactive mitigation of safety hazards and safety risks in all types of small businesses.

Authors: Esterhuyzen E, Louw LB.

Full Source: Jamba. 2019 Aug 19;11(1):767. doi: 10.4102/jamba.v11i1.767.

eCollection 2019.

This study reports on a secondary data analysis of relevant literature on safety hazards and safety risk and the role thereof on small business success.

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#### Evaluation of Pesticides Found in Oregon Cannabis from 2016 to 2017.

2019-11-19

Pesticide use and worker exposures to pesticides in the US cannabis industry have not been studied due to cannabis being illegal at the federal level. Without knowing the types of pesticides being used in this industry, it is difficult to assess whether workers are being exposed to potentially dangerous pesticides. When recreational cannabis became legal in the state of Oregon in 2014, the Oregon Department of Agriculture (ODA) published a list of recommended pesticides for use in the cannabis industry and developed the state's pesticide testing regulations for all cannabis products, medicinal and recreational. Using the state's pesticide testing data, the aim of this study was to investigate the types of pesticides being used in the Oregon cannabis industry and if they present a hazard to cannabis workers. Both recreational and medicinal cannabis samples contained high levels of residual pesticides and pesticides not legally allowed to be used on cannabis products. Medicinal cannabis products were found to have mean levels of residual pesticides that were 3-12 times higher than recreational products. Nine of the 50 pesticides identified were classified highly or extremely hazardous by the World Health Organization.

Authors: Evoy R, Kincl L.

Full Source: *Annals in Work Exposure & Health*. 2019 Oct 17. pii: wxz075. doi: 10.1093/annweh/wxz075. [Epub ahead of print]

#### Differential Exposure to Job Stressors: A Comparative Analysis Between Migrant and Australia-Born Workers

2019-11-19

Previous studies have suggested that migrants have higher exposures to psychosocial job stressors than native-born workers. The authors explored migrant status-related differences in skill discretion/job complexity and decision authority, and whether the differences varied by gender, age, and educational attainment. Data were from Wave 14 of the Household Income and Labour Dynamics in Australia (HILDA) Survey. A total number of 9031 persons were included in the analysis. Outcomes included skill discretion/job complexity and decision authority. Exposure included migrant status defined by (i) country of birth (COB), (ii) the combination of COB and English/Non-English dominant language of COB, and (iii) the combination of COB and years since arrival in Australia. Data were analysed using linear regression, adjusting for gender, age, and educational attainment.

higher exposures to psychosocial job stressors than native-born workers. The authors explored migrant status-related differences in skill discretion/job complexity and decision authority, and whether the differences varied by gender, age, and educational attainment.

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These covariates were also analysed as effect modifiers of the relationship between migrant status and job stressor exposure. In the unadjusted analysis, only migrant workers from Non-English-speaking countries (Non-ESC-born) had significantly lower skill discretion and job complexity than Australia-born workers (-0.29, 95% CI: -0.56; -0.01); however, results from fully adjusted models showed that all migrant groups, except migrant workers from Main-English-speaking countries, had significantly lower skill discretion and job complexity than Australia-born workers (overseas-born workers, -0.59, 95% CI: -0.79; -0.38; Non-ESC-born, -1.01, 95% CI: -1.27; -0.75; migrant workers who had arrived  $\leq 5$  years ago, -1.33, 95% CI: -1.94; -0.72; arrived 6-10 years ago, -0.92, 95% CI: -1.46; -0.39; and arrived  $\geq 11$  years ago, -0.45, 95% CI: -0.67; -0.22). On the contrary, the unadjusted model showed that migrant workers had higher decision authority than Australia-born workers, whereas in the fully adjusted model, no difference in decision authority was found between migrant workers and Australia-born workers. Effect modification results showed that as educational attainment increased, differences in skill discretion and job complexity between Australia-born workers and Non-ESC-born migrants progressively increased; whereas Non-ESC-born migrants with postgraduate degree showed significantly lower decision authority than Australia-born workers. This study suggests that skill discretion and job complexity but not decision authority is associated with migrant status. Migrants with high educational attainment from Non-English-speaking countries appear to be most affected by lower skill discretion/job complexity and decision authority; however, differences in skill discretion and job complexity attenuate over time for Non-ESC-born migrants, consistent with an acculturation effect. Low skill discretion and job complexity, to the extent that it overlaps with underemployment, may adversely affect migrant workers' well-being. Targeted language skill support could facilitate migrant integration into the Australian labour market.

Authors: Liu X, Bowe SJ, Milner A, Li L, Too LS, Lamontagne AD.

Full Source: *Annals in Work Exposure & Health*. 2019 Oct 17. pii: wxz073. doi: 10.1093/annweh/wxz073. [Epub ahead of print]

The aim of this large multinational study was to determine more accurately which clinical signs of skin- and volume-related facial aging are associated with tobacco and alcohol use in women.

### PUBLIC HEALTH RESEARCH

#### Impact of Smoking and Alcohol Use on Facial Aging in Women: Results of a Large Multinational, Multiracial, Cross-sectional Survey

2019-11-19

Data on associations between facial aging and smoking or alcohol consumption is generally derived from small studies, and therefore, vary. The aim of this large multinational study was to determine more accurately which clinical signs of skin- and volume-related facial aging are associated with tobacco and alcohol use in women. This was a subanalysis of a global, cross-sectional, Internet-based survey of self-reported facial aging. Women aged 18 to 75 years old (n=3,267) from the United States, Australia, Canada, and the United Kingdom who described themselves as white, Asian, black, or Hispanic were included. Measurements: Using a mirror, participants determined their own aging severity on photonumeric rating scales for 11 facial characteristics. Linear regressions were used to assess associations between each feature's severity and smoking status (never vs. current and former smoker); smoking pack years (0 versus 1-10, 11-20, and >20 years); alcohol use (none vs. moderate and heavy); and alcoholic beverage type, after controlling for body mass index, country, age, and race. Smoking was associated with an increased severity of forehead, crow's feet, and glabellar lines; under-eye puffiness; tear-trough hollowing; nasolabial folds; oral commissures; perioral lines; and reduced lip fullness ( $p \leq 0.025$ ) but not midface volume loss or visible blood vessels. Heavy alcohol use ( $\geq 8$  drinks/week) was associated with increased upper facial lines, under-eye puffiness, oral commissures, midface volume loss, and blood vessels ( $p \leq 0.042$ ). The authors concluded that smoking and alcohol consumption significantly but differentially impact skin and volume-related facial aging.

Authors: Goodman GD, Kaufman J, Day D, Weiss R, Kawata AK, Garcia JK, Santangelo S, Gallagher CJ.

Full Source: Journal of Clinical and Aesthetic Dermatology. 2019 Aug;12(8):28-39. Epub 2019 Aug 1.

#### Effect modifiers of lung function and daily air pollutant variability in a panel of schoolchildren

2019-11-19

Acute pollutant-related lung function changes among children varies across pollutants and lag periods. The authors examined whether short-

The authors examined whether short-term air pollutant fluctuations were related to daily lung function among a panel of children and whether these effects are modified by airway hyperresponsiveness, location and asthma severity.

term air pollutant fluctuations were related to daily lung function among a panel of children and whether these effects are modified by airway hyperresponsiveness, location and asthma severity. Students from randomly selected grade 4 classrooms at seven primary schools in Durban, participated, together with asthmatic children from grades 3-6 (n=423). The schools were from high pollutant exposed communities (south) and compared with schools from communities with lower levels of pollution (north), with similar socioeconomic profiles. Interviews, spirometry and methacholine challenge testing were conducted. Bihourly lung function measurements were performed over a 3-week period in four phases. During all schooldays, students blew into their personal digital monitors every 1.5-2 hours. Nitrogen dioxide (NO<sub>2</sub>), nitrogen oxide (NO), sulphur dioxide and particulate matter (<10 µm diameter) (PM<sub>10</sub>) were measured at each school. Generalised estimating equations assessed lag effects, using single-pollutant (single or distributed lags) models. FEV<sub>1</sub> declines ranged from 13 to 18 mL per unit increase in IQR for NO and 14-23 mL for NO<sub>2</sub>. Among the 5-day average models, a 20 mL and 30 mL greater drop in FEV<sub>1</sub> per IQR for NO<sub>2</sub> and NO, respectively, among those with airway hyperresponsiveness compared with those without. Effects were seen among those with normal airways. This first panel study in sub-Saharan Africa, showed significant declines in lung function, in response to NO and NO<sub>2</sub> with effects modified by airway hyperresponsiveness or persistent asthma.

Authors: Mentz G, Robins TG, Batterman S, Naidoo RN.

Full Source: Thorax. 2019 Sep 18. pii: thoraxjnl-2017-211458. doi: 10.1136/thoraxjnl-2017-211458. [Epub ahead of print]

### Exposure to heavy metals from point pollution sources and risk of incident type 2 diabetes among women: a prospective cohort analysis

2019-11-19

Heavy metal exposures may contribute to diabetes risk but prospective studies are uncommon. In the present study, the authors analysed the Australian Longitudinal Study on Women's Health (three cohorts aged 18-23, 45-50, or 70-75 at baseline in 1996, N = 34,191) merged with emissions data for 10 heavy metals (As, Be, Co, Cr, Cu, Hg, Mn, Ni, Pb, Zn) from the National Pollutant Inventory. Over 20-year follow-up, 2,584 women (7.6%) reported incident diabetes. Cox proportional hazards regression models showed that women aged 45-50 at baseline had higher diabetes risk in association with exposure to total air emissions, total water emissions, all individual metals air emissions, and six individual water emissions.

In the present study, the authors analysed the Australian Longitudinal Study on Women's Health merged with emissions data for 10 heavy metals from the National Pollutant Inventory.

After correction for false discovery rate, nine of 11 air emissions and five water emissions remained significant. Associations were not observed for land-based emissions, or for younger or older cohorts. Emissions were dominated by mining, electricity generation and other metals-related industrial processes.

Authors: Hendryx M, Luo J, Chojenta C, Byles JE.

Full Source: International Journal of Environmental Health Research. 2019 Sep 19:1-12. doi: 10.1080/09603123.2019.1668545.[Epub ahead of print]

### Potential health effects of emerging environmental contaminants perfluoroalkyl compounds

2019-11-19

Environmental contaminants are one of the important causal factors for development of various human diseases. In particular, the perinatal period is highly vulnerable to environmental toxicants and resultant dysregulation of foetal development can cause detrimental health outcomes potentially affecting life-long health. Perfluoroalkyl compounds (PFCs), emerging environmental pollutants, are man-made organic molecules, which are widely used in diverse industries and consumer products. PFCs are non-degradable and bioaccumulate in the environment. Importantly, PFCs can be found in cord blood and breast milk as well as in the general population. Due to their physicochemical properties and potential toxicity, many studies have evaluated the health effects of PFCs. This review summarises the epidemiological and experimental studies addressing the association of PFCs with neurotoxicity and immunotoxicity. While the relationships between PFC levels and changes in neural and immune health are not yet conclusive, accumulative studies provide evidence for positive associations between PFC levels and the incidence of attention deficit hyperactivity disorder and reduced immune response to vaccination both in children and adults. In conclusion, PFCs have the potential to affect human health linked with neurological disorders and immunosuppressive responses. However, our understanding of the molecular mechanism of the effects of PFCs on human health is still in its infancy. Therefore, along with efforts to develop methods to reduce exposure to PFCs, studies on the mode of action of these chemicals are required in the near future.

Author: Lee YJ.

Full Source: Yeungnam University Journal of Medicine. 2018 Dec 31;35(2):156-164. doi: 10.12701/yujm.2018.35.2.156. eCollection 2018 Dec.

This review summarises the epidemiological and experimental studies addressing the association of PFCs with neurotoxicity and immunotoxicity.

### Cigarette Smokers vs. Co-users of Cannabis and Cigarettes: Exposure to Toxicants

2019-11-19

Cannabis and tobacco co-use is common and could expose users to higher levels of toxicants. No studies have examined biomarkers of toxicant exposure in co-users of cannabis and cigarettes, compared with cigarette smokers. Adult daily cigarette smokers were recruited from 10 U.S. sites for a study of reduced nicotine cigarettes. In this analysis of baseline data, participants were categorized as either co-users of cannabis and tobacco (co-users; N=167; urine positive for 11-nor-9-carboxy- $\Delta$ 9 tetrahydrocannabinol and self-reported cannabis use  $\geq$  1x/week), or cigarette smokers (CS; N=911; negative urine and no self-reported cannabis use). Participants who did not meet either definition (N=172) were excluded. Self-reported tobacco and cannabis use and tobacco/combustion-related biomarkers of exposure were compared between groups. Compared to CS, co-users were younger (co-user Mage=38.96, SD=13.01; CS Mage=47.22, SD=12.72;  $p < .001$ ) and more likely to be male (co-users=67.7%, CS=51.9%,  $p < .001$ ). There were no group differences in self-reported cigarettes/day, total nicotine equivalents, or breath carbon monoxide, but co-users had greater use of non-cigarette tobacco products. Compared to CS, co-users had higher concentrations of 3-hydroxypropylmercapturic acid, 2-cyanoethylmercapturic acid, S-phenylmercapturic acid, 3-hydroxy-1-methylpropylmercapturic acid ( $p < .05$ ) and phenanthrene tetraol (PheT;  $p < .001$ ). No biomarkers were affected by number of cannabis use days/week or days since last cannabis use during baseline ( $p > .05$ ). Co-users had higher concentrations of biomarkers of exposure than CS, but similar number of cigarettes per day and nicotine exposure. Additional studies are needed to determine whether cannabis and/or alternative tobacco products are driving the increased toxicant exposure. Co-users of cannabis and tobacco appear to be exposed to greater levels of harmful chemicals (i.e., volatile organic compounds and polycyclic aromatic hydrocarbons), but similar levels of nicotine as cigarette smokers. It is unclear if the higher levels of toxicant exposure in co-users are due to cannabis use or the increased use of alternative tobacco products compared with cigarette smokers. It is important for studies examining biomarkers of exposure among cigarette smokers to account for cannabis use as it may have a significant impact on

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outcomes. Additionally, further research is needed examining exposure to harmful chemicals among cannabis users.

Authors: Meier E, Vandrey R, Rubin N, Pacek LR, Jensen JA, Donny EC, Hecht SS, Carmella SG, Murphy SE, Luo X, Stepanov I, Ikuemonisan J, Severson H, al'Absi M, Hatsukami DK.

Full Source: Nicotine & Tobacco Research. 2019 Oct 16. pii: ntz199. doi: 10.1093/ntr/ntz199. [Epub ahead of print]