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The study analysed the chemical and physical properties of cadmium and its basic compounds, which are needed in the different industrial sectors and its toxicity to the living organism. The analysis was carried out on standards of cadmium and its compounds and addition maximum permissible concentration for ground and the object of economic drinkable water. The authors summarised the extraction of heavy metals from the water solutions, purification of waste water and the ground water.

Authors: Kozub, S. N.; Lavrenko, A. A.; Kozub, P. A.; Gnin, G. I.; Pancheva, A. M.; Deineka, D. N.

Full Source: Visnik Natsional’nego Tekhnichnogo Universitetu “KhPI” 2008, (41), 65-72 (Russ).

The dichloroacetate dilemma: environmental hazard versus therapeutic goldmine - both or neither?

2011-05-09

The objective of this study was to review laboratorial and clinical pharmacological research on Dichloroacetate (DCA) to address questions about the current and future status of DCA in relation to human health. Adverse effects from chronic DCA exposure have been identified in several target organs in animals. However, in humans, toxicity has so far been limited to reversible effects on the nervous system and liver. DCA is primarily biotransformed to glyoxylate by the bifunctional enzyme glutathione transferase zeta1 and maleylacetoacetate isomerase (GSTz1/MAAI), which also catalyses the penultimate step in the phenylalanine and tyrosine catabolic pathway. DCA is a suicide inhibitor of GSTz1/MAAI, which can result in delayed plasma clearance of DCA and the accumulation of potentially toxic tyrosine intermediates. Age and GSTz1/MAAI haplotype can markedly affect the toxicokinetics of DCA in humans and rodents. The author defined new potential avenues of research that focus on discrete human populations that may be at increased health risk or that may receive increased health benefit from chronic exposure to DCA at both environmentally and clinical relevant concentrations.

Author: Stacpoole, Peter W

Full Source: Environmental Health Perspectives 2011, 119(2), 155-158 (English)
The study examined whether diesel exhaust particles (DEPs) potentially have a direct effect on capillary endothelia by following the adherens junction component, vascular endothelial cell cadherin (VE-cadherin). This molecule is incorporated into endothelial adherens junctions at the cell surface, where it forms homodimeric associations with adjacent cells and contributes to the barrier function of the vasculature. The method was using human umbilical vein endothelial cells (HUVECs) that were preformed into capillary-like tube networks in vitro exposed to DEPs for 24 hour. After exposure, the integrity of VE-cadherin in adherens junctions was assessed by immunofluorescence analysis and demonstrated that increasing concentration of DEPs caused increasing redistribution of VE-cadherin away from the cell-cell junctions toward intracellular locations. Since HUVEC tube networks are three-dimensional structures, whether particles entered the endothelial cells or tubular lumens was also examined. The data indicate that translocation of the particles does occur. The results, obtained in a setting that removes the confounding effects of inflammatory cells or blood components, suggest that if DEPs encounter alveolar capillaries in vivo, they may be able to directly affect the endothelial cell-cell junctions.

Authors: Chao, Ming-Wei; Kozlosky, John; Po, Iris P.; Strickland, Pamela Ohman; Svoboda, Kathy K. H.; Cooper, Keith; Laumbach, Robert J.; Gordon, Marion K.

Full Source: Toxicology 2011, 279(1-3), 73-84 (Eng)
The study aimed to find out the mechanism of toxicity of benzene (BZ), toluene (TOL) and o-xylene (o-XY) and identify the apoptotic pathway(s) activated by BZ, TOL, and o-XY in human HL-60 promyelocytic leukaemia cells. Cell cycle analysis by propidium iodide (PI) staining and flow cytometric analyses of Annexin V/PI double-stained cells revealed similar patterns of apoptosis following BZ, TOL, and o-XY exposure.
The study aimed to elucidate the mechanism of nickel (Ni) compounds exposure associated with a variety of pulmonary adverse health effects, such as lung inflammation, fibrosis, emphysema and tumours. They used Calu-3, a well differentiated human bronchial cell line, to investigate in vitro the effect of Ni in solution form (NiCl2) and in the form of micro-sized Ni particles on the airway epithelium. It evaluated the effect of Ni compounds on the epithelial barrier integrity by monitoring the trans epithelial electro resistance (TEER) and on oxidative stress pathways by measuring reactive oxygen species (ROS) formation and induction of stress inducible genes. The results showed that exposure to NiCl2 and Ni particles resulted in a disruption of the epithelial barrier function observed by alterations in TEER, which occurred prior to the decrease in cell viability. Moreover, Ni compounds induced oxidative stress associated with ROS formation and up-regulation of the stress-inducible genes, metallothionein 1X (MT1X), heat shock protein 70 (HSP70), heme oxygenase-1 (HMOX-1), and c-glutamylcysteine synthetase (cGCS). The study demonstrated that the induced effects by Ni compound can be partially attributed to the increase in Ni ions (Ni2+) intracellular levels.

Authors: Forti, Efrat; Salovaara, Susan; Cetin, Yuksel; Bulgheroni, Anna; Tessadri, Richard; Jennings, Paul; Pfaller, Walter; Prieto, Pilar.
Full Source: Toxicology in Vitro 2011, 25(2), 454-461 (Eng)
Human volunteer studies investigating the potential for toxicokinetic interactions between the pesticides deltamethrin; pirimicarb and chlorpyrifos-methyl following oral exposure at the acceptable daily intake
2011-05-09
The purpose of the study was to investigate any potential interactions that may occur during dietary exposure of pesticides deltamethrin or pirimicarb at the acceptable daily intake (ADI) together with chlorpyrifos-Me. Urine samples were collected at time points up to at least 48 h post-exposure and metabolites were quantified. Urinary metabolite excretion data obtained from the mixed exposures were compared with data obtained from the same individuals given a dose of each individual pesticide on a separate occasion. Metabolite excretion profiles for both pesticides administered as a mixed dose with chlorpyrifos-Me were qualitative similar to those obtained for the individual doses. Peak excretion of deltamethrin and pirimicarb metabolites occurred at around 4 h post-exposure for both the individual and the mixed exposure scenarios, and metabolite excretion was almost complete within 24 h. No statistically significant differences were found between the individual and mixed doses for either metabolite excretion half-life or metabolite levels quantified in 24-h total urine collections. The authors concluded that no significant toxicokinetic interactions occur between either deltamethrin or pirimicarb and chlorpyrifos-Me when orally administered together at the ADI.
Authors: Sams, Craig; Jones, Kate
Full Source: Toxicology Letters 2011, 200(1-2), 41-45 (Eng)

OCCUPATIONAL

Pneumoproteins and inflammatory biomarkers in asphalt pavers
2011-05-09
In this study, the authors investigated pneumoproteins, biomarkers of systemic inflammation and endothelial activation, across a season in 72 asphalt pavers, 32 asphalt plant operators and 19 asphalt engineers. The results demonstrated that smokers had lower concentrations of Clara cell protein (CC-16) and surfactant protein A, but higher concentrations of surfactant protein D, interleukin 6, C-reactive protein, fibrinogen and intercellular adhesion molecule (ICAM)-1 than non-smokers. Smokers reporting wheezing had lower mean CC-16 concentration than smokers not reporting wheezing (5.7 versus 8.6íg l-1; p ) 0.05). Cholesterol,
The present study investigated the frequency, potential sources and adverse health effects of elevated blood lead level (BLL) in the children of lead-related occupational workers. The children of occupational workers had significantly increased frequency (31%) of lead poisoning. The potential source of lead overexposure in these children may be indirect through father’s clothes and contaminated environment at home. Increased lead accumulation adversely affects health of these children.

Authors: Khan, Dilshad Ahmed; Qayyum, Shazia; Saleem, Shahid; Ansari, Wafa Munir; Khan, Farooq Ahmad

Full Source: Toxicology and Industrial Health 2010, 26(8), 497-504 (Eng)
To characterise the effect of arsenic on redox status, copper smelter workers (study group) and arsenic unexposed donors (control) were recruited for this study. Urine samples and lymphocyte enriched fractions collected from donors were analysed to determine arsenic levels and lymphocyte proliferation. Moreover, the authors studied the presence of oxidative markers MDA, vitamin E and SOD activity in donor plasma. The results demonstrated that those exposed to high arsenic concentrations have lymphocyte MDA and arsenic urinary levels that showed a positive correlation with SOD activity, and a negative correlation with vitamin E serum levels. Strikingly, lymphocytes from the arsenic exposed population respond to a polyclonal stimulator, phytohemaglutinin, with higher rates of thymidine incorporation than lymphocytes of a control population. As well, similar in vitro responses to arsenic were observed using a T cell line. The authors concluded that the results from this study suggest that chronic human exposure to arsenic induces oxidative damage in lymphocytes and could be considered more relevant than evaluation of T cell surveillance.

Authors: Escobar, Jorge; Varela-Nallar, Lorena; Coddou, Claudio; Nelson, Pablo; Maisey, Kevin; Valdes, Daniel; Aspee, Alexis; Espinosa, Victoria; Rozas, Carlos; Montoya, Margarita; Mandiola, Cristian; Rodriguez, Felipe E.; Acuna-Castillo, Claudio; Escobar, Alejandro; Fernandez, Ricardo; Diaz, Hernan; Sandoval, Mario; Imarai, Monica; Rios, Miguel

Full Source: Mediators of Inflammation [online computer file] 2010, 403830, 8 pp. (Eng)
The present study summarises the recent literature on the relation between cleaning exposures and respiratory health, in particular asthma, including reviews, epidemiological surveys, surveillance programs and exposure studies.

Authors: Bi, Yongyi; Li, Yuhong; Kong, Mengmeng; Xiao, Xiao; Zhao, Zhiwei; He, Xiaqing; Ma, Giang
Full Source: Chemico-Biological Interactions 2010, 184(1-2), 207-211 (Eng)

Update on asthma and cleaners
2011-05-09
The present study summarises the recent literature on the relation between cleaning exposures and respiratory health, in particular asthma, including reviews, epidemiological surveys, surveillance programs and exposure studies. In addition, the authors aimed to identify gaps in the current knowledge and to recommend future research on the topic. Recent findings: A large international general population study showed an increased risk of new-onset asthma associated with cleaning work, with professional use of cleaning products and with domestic use of cleaning sprays. Three surveillance studies confirm the recognition of

poisoning and seven matched controls. Twenty-two genes were found up-regulated and 18 down-regulated in benzene patients compared with controls. This study reports the characterisation of two benzene-regulated genes. CYP4F3A, which encodes the leukotriene B4 (LTB4) \(\omega\)-hydroxylase, is important for inactivation of LTB4 in neutrophils. CYP4F3A mRNA was found elevated in all patients; moreover, CYP4F3A mRNA and protein were induced by benzene metabolite phenol in HL-60 and K562 cells as well as ex vivo in human peripheral neutrophils. Silencing of CYP4F3A in HL-60 cells by lentiviral delivery of CYP4F3A-specific siRNA reduced cell survival to 56\%, 44\%, 22\%, 14\%, and 3\% at 3, 4, 5, 6, and 7 days, respectively; the results suggest that CYP4F3A is a critical positive regulator of HL-60 proliferation. DNA-dependent protein kinase catalytic subunit (DNA-PKcs) regulates non-homologous end joining (NHEJ) in DNA double strand break (DSB) repair. DNA-PKcs mRNA was found consistently increased in the patients and DNA-PKcs mRNA and protein were induced by hydroquinone in HL-60 cells. In a DSB model, hydroquinone induced the formation of \(\gamma\)-H2AX foci, a marker of DSBs, in HL-60 cells. The findings indicate that hydroquinone induces DSBs and induction correlates with elevated levels of DNAPKcs and NHEJ. Similar results were obtained in K562 cells treated with phenol. Since NHEJ is error-prone, induction of DNA-PKcs and NHEJ may contribute to mutagenesis and leukaemia by benzene. This study demonstrated for the first time that benzene and metabolites induce CYP4F3A and DNA-PKcs both in vivo and in vitro. Induction of the genes may play a role in the pathogenesis of benzene haematotoxicity and serve as biomarkers of benzene exposure.

Authors: Bi, Yongyi; Li, Yuhong; Kong, Mengmeng; Xiao, Xiao; Zhao, Zhiwei; He, Xiaqing; Ma, Giang
Full Source: Chemico-Biological Interactions 2010, 184(1-2), 207-211 (Eng)
In this study, the authors assessed the exposure of the Flemish population to brominated flame retardants (BFRs) and perfluorinated compounds (PFCs) by analysis of pooled cord blood, adolescent and adult serum, and human milk. Levels of polybrominated diphenyl ethers (PBDEs) in blood (range 1.6-6.5 ng/g lipid weight, lw) and milk (range 2.0-6.4 ng/g lw) agreed with European data. Hexabromocyclododecane ranged between <2.1-5.7 ng/g lw in milk. Perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) dominated in blood and ranged between 1 and 171 ng/mL and <0.9-9.5 ng/mL, respectively. Total PFC levels in milk ranged between <0.5-29 ng/mL. A significant increase in PBDE concentrations was detected from newborns (median 2.1) to the adolescents and adults (medians 3.8 and 4.6 ng/g lw, respectively). An identical trend was observed for PFOS, but not for PFOA. The authors estimated that newborn exposure to BFRs and PFCs occurs predominantly postnatally, whereas placental transfer has a minor impact on the body burden. The exposure to BFRs and PFCs of general Flemish population has been assessed throughout several age groups.
In Germany, the Human Biomonitoring Commission of the Federal Environment Agency continuously assesses environmental pollutants to derive human biomonitoring (HBM) and reference values. HBM values are derived on the basis of toxicological, epidemiological studies or toxicokinetic extrapolation which provides a concentration of a substance or its metabolites corresponding to tolerable intake doses. Two levels are defined: HBM I and HBM II. In 1996, the Commission set a HBM I of 100 ìg/l for lead in blood of children ≤12 years and females of a reproductive age and a HBM I of 150 ìg/l for the other persons. In the light of findings from epidemiological studies on effects below 100 ìg/l, the Commission re-evaluated and confirmed the assessment from 1996 in 2002. Meanwhile the general decline in lead pollution has allowed recent studies to include more cohorts with blood lead levels predominantly below 100 ìg/l. These data confirm that lead’s critical effect, particularly on the developing organism and during early childhood, concerns the nervous system and that negative correlations between blood lead levels and relevant variables [cognitive function, behaviour] occur at blood lead levels below 100 ìg/l. In addition, the new data support the possible persistence of lead-induced effects into adulthood. It is not possible to indicate thresholds. Concerning the estimation of the size of the effects, recent studies suggest that lead’s influence on development is comparable with other factors influencing development. Furthermore inorganic lead and compounds were classified by IARC in group 2A [probably carcinogenic to humans] and by the German Research Foundation [MAK Commission] in category 2 [to be regarded as human carcinogen]. The authors concluded that any setting of an "effect threshold" for blood lead levels would be arbitrary and therefore unjustified. As a consequence the Commission suspends the HBM values for lead in blood of children and adults.

**Reassessment of critical lead effects by the German Human Biomonitoring Commission results in suspension of the human biomonitoring values (HBM I and HBM II) for lead in blood of children and adults**

2011-05-09

In Germany, the Human Biomonitoring Commission of the Federal Environment Agency continuously assesses environmental pollutants to derive human biomonitoring (HBM) and reference values. HBM values are derived on the basis of toxicological, epidemiological studies or toxicokinetic extrapolation which provides a concentration of a substance or its metabolites corresponding to tolerable intake doses. Two levels are defined: HBM I and HBM II. In 1996, the Commission set a HBM I of 100 ìg/l for lead in blood of children ≤12 years and females of a reproductive age and a HBM I of 150 ìg/l for the other persons. In the light of findings from epidemiological studies on effects below 100 ìg/l, the Commission re-evaluated and confirmed the assessment from 1996 in 2002. Meanwhile the general decline in lead pollution has allowed recent studies to include more cohorts with blood lead levels predominantly below 100 ìg/l. These data confirm that lead’s critical effect, particularly on the developing organism and during early childhood, concerns the nervous system and that negative correlations between blood lead levels and relevant variables [cognitive function, behaviour] occur at blood lead levels below 100 ìg/l. In addition, the new data support the possible persistence of lead-induced effects into adulthood. It is not possible to indicate thresholds. Concerning the estimation of the size of the effects, recent studies suggest that lead’s influence on development is comparable with other factors influencing development. Furthermore inorganic lead and compounds were classified by IARC in group 2A [probably carcinogenic to humans] and by the German Research Foundation [MAK Commission] in category 2 [to be regarded as human carcinogen]. The authors concluded that any setting of an "effect threshold" for blood lead levels would be arbitrary and therefore unjustified. As a consequence the Commission suspends the HBM values for lead in blood of children and adults.

Authors: Wilhelm, Michael; Heinzow, Birger; Angerer, Juergen; Schulz, Christine

**Authors:** Roosens, Laurence; D'Hollander, Wendy; Bervoets, Lieven; Reynders, Hans; Van Campenhout, Karen; Cornelis, Christa; Van Den Heuvel, Rosette; Koppen, Gudrun; Covaci, Adrian

**Full Source:** Environmental Pollution (Oxford, United Kingdom) 2010, 158(8), 2546-2552 (Eng)
Investigation of the interaction between endocrine disruptor bisphenol A and human serum albumin

2011-05-09

In this study, the interaction of the endocrine disruptor bisphenol A (BPA) and human serum albumin (HSA) was investigated by molecular modelling, fluorescence, UV-visible spectroscopy (UV-vis), Fourier transform IR spectroscopy (FT-IR) and CD spectroscopy (CD). The association constants between BPA and HSA were detected using the Scatchard equation. The thermodynamic parameters of the binding reaction (ΔG°, ΔH° and ΔS°) were measured, and they indicated the presence of hydrophobic forces in the BPA-HSA interaction, which agreed well with the results from molecular modelling. The alterations of protein secondary structure in the presence of BPA were confirmed by UV-vis, FT-IR and CD spectroscopy. Lastly, the average binding distance, r, between BPA and HSA was evaluated and found to be 1.82 nm according to Foerster’s theory of nonradiation energy transfer.

Authors: Xie, Xiaoyun; Wang, Xiaoru; Xu, Xiangmei; Sun, Huijun; Chen, Xingguo

A prospective cohort study of pregnancy outcomes of women inadvertently exposed to methylephedrine in the first trimester of pregnancy

2011-05-09

Currently, there is no information available on the safety of methylephedrine, a component of various cold medications available in South Korea. With previous approval by an Institutional Review Board, 349 women inadvertently exposed to methylephedrine during the first trimester of pregnancy and an age- and gravidity-matched control group, were enrolled in a prospective cohort study. Study outcomes, for example gestational age at birth, birth wt. and major and minor malformations were evaluated in 282 cases and 280 controls. Exposure to methylephedrine was at a gestational age of 4.0 wk (median), at doses ranging from 52.5 to 1,575 mg/day, for a median duration of 3 (range: 1-30) days. No differences were observed between cases and controls in any of the pregnancy outcomes studied. There were 4/265 (1.5%) babies born with major malformations in the case group and 4/260 (1.5%) in the
control group. In conclusion, the authors found that inadvertent exposure to methylephedrine as a component of over-the-counter oral cold remedies in early pregnancy was not associated with an increased rate of adverse pregnancy outcomes. Co-exposure with acetaminophen, cigarette smoking or alcohol did not appear to modify the outcomes.

Authors: Lee, H. J.; Han, J. Y.; Yook, J. H.; Choi, J. S.; Ahn, H. K.; Kim, M. Y.; Song, I. O.; Yang, J. H.; Nava-Ocampo, A. A.

Full Source: Journal of Obstetrics and Gynaecology (New York, NY, United States) 2010, 30(6), 563-566 (Eng)

Prenatal exposure to airborne polycyclic aromatic hydrocarbons and children’s intelligence at 5 years of age in a prospective cohort study in Poland

2011-05-09

In this prospective cohort study of Caucasian mothers and children in Krakow, Poland, the authors evaluated the role of prenatal exposure to urban air pollutants in the pathogenesis of neurobehavioral disorders. This study investigated the relationship between prenatal polycyclic aromatic hydrocarbon (PAH) exposure and child intelligence at 5 years of age, controlling for potential confounders suspected to play a role in neurodevelopment. A cohort of pregnant, healthy, non-smoking women was enrolled in Krakow, Poland, between 2001 and 2006. During pregnancy, participants were invited to complete a questionnaire and undergo 48-h personal air monitoring to estimate their babies’ exposure, and to provide a blood sample and/or a cord blood sample at the time of delivery. Two hundred fourteen children were followed through 5 years of age, when their nonverbal reasoning ability was assessed using the Raven Coloured Progressive Matrixes (RCPM). The results showed that higher (above the median of 17.96 ng/m3) prenatal exposure to airborne PAHs (range, 1.8-272.2 ng/m3) was associated with decreased RCPM scores at 5 years of age, after adjusting for potential confounding variables (n = 214). Further adjusting for maternal intelligence, lead, or dietary PAHs did not alter this association. The reduction in RCPM score associated with high airborne PAH exposure corresponded to an estimated average decrease of 3.8 IQ points. The authors concluded that the results suggest that prenatal exposure to airborne PAHs adversely affects children’s cognitive development by 5 years of age, with potential implications for school performance. They are consistent with a recent finding in a parallel cohort in New York City.

Authors: Edwards, Susan Claire; Jedrychowski, Wieslaw; Butscher, Maria; Camann, David; Kieltyka, Agnieszka; Mroz, Elzbieta; Flak, Elzbieta;
The study aimed to define a coal mine gas control method and gas decomposing/eliminating solution. The sample was prepared by mixing 1-3 weight percent beer, 8-15 weight percent acetic acid, 0.05-0.1 weight percent cobalt acetate, 1-2 weight percent yeast extract, and water as balance. The gas control method consists of: drilling solution injection holes in the coal of a coal mine working face, with 0.6-1.5 m spacing between holes and a drilling direction coincident with the coal seam inclination direction or forming a 0-20° included angle with that seam inclination direction; injecting the gas decomposing/eliminating solution into the solution injection holes at 8-16 Mpa; and sealing the holes and reacting for 3.5-5 hour. The gas decomposing/eliminating solution is environment-friendly and does not harm coal quality or use; its raw materials and the finished product are innocuous. The authors concluded this low cost method and solution had a simple operation and provided a good gas control.

Authors: Wu, Xingjian; Wu, Qing.
Full Source: Faming Zhuanli Shenqing CN 101,906,989 (Cl. E21F7/00), 8 Dec 2010, Appl. 10,239,553, 29 Jul 2010; 8pp. (Ch).

Distribution method of input and output gas flow for coal mine ventilation air methane oxidation device
2011-05-09
This study aimed to define a method and coal mine ventilation air CH4 [VAM] application to distribute inflow/outflow gas. The VAM oxidation application was comprised of: a gas inflow/outflow flow reversing valve; an oxidation bed; and right and left air channels. The distribution method had: flow splitting partitioning plates and air quantity adjusting mechanisms installed in the left and right air channels to split VAM in horizontal and vertical directions to ensure CH4 concentration and uniform air inflow to and outflow from the oxidation bed, prevent upward CH4 drift and
Remote Leak Detection
2011-05-09
This is a study on a remote leak detection method on a helium vessel of an MRI system (MRI: Magnetic Resonance Imaging), due to development of MRI containing a superconducting magnet. Helium can leak out and air can diffuse into the system. Ice accumulates in the helium vessel, which can cause a restriction in the turret and make certain service operations difficult. Under these conditions the magnet is intrinsically safe because of an auxiliary vent which remains ice-free; still it is preferable to detect such a situation earlier on in the main quench gas path. Another common problem concerning MRI magnets is to ensure that the relief valve which is sealed with a silicone O-ring remains leak tight after a quench. Currently this involves removing the valve, inspecting the integrity of the O-ring, and checking if there are no significant particles trapped between the O-ring and its sealing face. The removal of the valve is quite difficult as the access is restricted by cables and pipe work. Also the manifold that is attached to the valve body is difficult to remove and replace due to the inevitable slight misalignment of quench line components. The conclusion is the current operation only required where a leak exists.

Author: Anon. (UK)
Full Source: IP.com Journal 13 Jul 2010, 10(7B), 29, No. IPCOM000197493D (Eng), IP.com, Inc.