



18th Global Summit on
Environmental Toxicology and Pharmacology

September 17-18, 2018 Singapore

Posters

18th Global Summit on

ENVIRONMENTAL TOXICOLOGY AND PHARMACOLOGY

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Clinical effects and gene expression profiles in human volunteers in an office test room following three-day exposure to laser printer emissions

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Background & Aim: Laser printers release aerosols into the environment including solid, liquid and gaseous compounds. The side effects possibly caused by these aerosols are having come under scrutiny. To investigate clinical effects and gene expression profiles we conducted a controlled human exposure study with laser printer emissions in an office test room.

Methodology: 80 healthy volunteers were exposed to laser printer emissions in 3 hour experiments under controlled conditions in an 80 m³ office test room over three consecutive days. Lung functions and FeNO and inflammatory blood parameters were examined before and after exposure. Microarray experiments were conducted with peripheral venous blood using a whole genome gene chip.

Results: Mean Sub Micrometer Particle (SMP) concentration during printing activities in the test room reached 15379±2799 P/cm³ (background: 1904±540 P/cm³). Lung function and blood parameters for inflammation (ECP, hsCRP) as well as FeNO showed no differences before and after exposure. The volunteers experienced temporary symptoms, such as irritation of the eyes, nose, throat and respiratory tract, coughing, headache and runny nose. We screened a total of 254 differentially expressed genes, of which 37 (15%) were down-regulated and 217 (85%) were up-regulated. Of the 217 up-regulated genes, 169 (78%) were directly related to an individual's immune regulation or response.

Conclusion: Laser printers emit SMPs particles during printing activity. The aerosols can induce irritation of eyes, skin and respiratory tract in the volunteers, but we cannot derive any severe acute dangerous health effects from the results of this study. The microarray study conducted here showed changes in terms of inflammation and immunological reactions in volunteers after exposure. Our results recommend that office workers should avoid laser printer emissions. Laser printers should be placed in a separate, well-ventilated room, or at least equipped with appropriate filter techniques.

Recent Publications

1. Tang T, Hurraß J, Gminski R, Mersch Sundermann V (2012) Fine and ultrafine particles emitted from laser printers as indoor air contaminants in German offices. *Environ Sci Pollut Res Int.*; 19(9): 3840-3849.

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2. Khatri M, Bello D, Martin J, Bello A, Gore R, Demokritou P, Gaines P (2017) Chronic upper airway inflammation and systemic oxidative stress from nanoparticles in photocopier operators: Mechanistic insights. *NanoImpact*; 5: 133-145.

Biography

Volker Mersch Sundermann is a professor at University of Freiburg, Germany.

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Toxicological assessment of Acetaminophen, Ibuprofen and Furosemide pharmaceuticals on aquatic organismsSoledad Chamorro¹, Margarita Lopéz¹, Gester Gutiérrez² and Cristina A Villamar³¹Universidad Santo Tomás, Colombia²Universidad de Concepción, Chile³Universidad de Santiago de Chile, Chile

Acetaminophen, ibuprofen and furosemide effect are inside of 140 pharmaceutical products detected in water resources. The main route of entry to aquatic environments of these compounds is from municipal wastewater to concentrations under 3 µg/L. Recalcitrance to biodegradation in wastewater treatment plant and their chemical properties (solubility, coefficient octanol-water) favored the presence and potential toxicological effect on organisms of aquatic environments. Therefore, the aim of this work was to assessment of these pharmaceutical products on freshwater organism *Daphnia magna* and *Selenastrum capricornutum*, as well as marine organisms such as *Artemia salina* and *Arbacia spatuligera*. The methodology was based on acute/chronic bioassays on *D. magna* (24-48 hours -LC₅₀, reproductive effects), *S. capricornutum* (72 hours-LC₅₀), *A. salina* (48 hours-LC₅₀) and *A. spatuligera* (reproductive effects). Pharmaceutical concentrations were tested in values from 1.0 to 260.0 mg/L for acetaminophen and ibuprofen, while concentrations from 1.0 to 64.0 mg/L for furosemide. Results demonstrate the acute toxicity from acetaminophen reached values between 0.26 mg/L for *S. capricornutum* and 21.40 mg/L *D. magna*. Furosemide showed acute toxicity of 37.01 mg/L for *A. salina* and 62.31 mg/L for *D. magna*. Finally, ibuprofen reached acute toxicity values under 0.01 mg/L and 78.11 mg/L for *S. capricornutum* and *D. magna* respectively. Chronic effects related with reproduction on *D. magna* showed values of media effective concentration (CE₅₀) of 15 mg/L for furosemide and 5 mg/L for ibuprofen. Therefore, toxicity effects on aquatic organisms of these pharmaceutical products depend on trophic level evaluated, being primary producers (*S. capricornutum*) more sensible than primary consumers (*D. magna*). Marine organisms (*A. salina*) are more resistant than freshwater organism (*D. magna*). Pharmaceutical products as acetaminophen, ibuprofen evidenced more toxicity than diuretics drug. Reproductive effects on *A. spatuligera* evidence that ibuprofen and acetaminophen (CE₅₀: 0.001 and 0.003 mg/L), respectively is more toxic than furosemide (CE₅₀: 0.36 mg/L).

Biography

Soledad Chamorro has her expertise in Toxicology Evaluation (lethal, sublethal, chronic and metabolic) through bio-indicators and biomarkers as algae, microcrustacean and fish.

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September 17-18, 2018 Singapore

Screening of cytotoxicity, oxidant generating capacity and inflammatory potential of two selected coal mine dusts as a contribution to the European ROCD project**Richard Gminski¹, Julia Burger¹, Enrico Furtwängler¹, Ali Arif¹, Volker Mersch Sundermann¹, Ben Williamson², Diane Johnson², Robi Lah³, Aleksander Wrana⁴, Pedro Trechera⁵ and Teresa Moreno⁵**¹University of Freiburg, Germany²University of Exeter, UK³Premogovnik Velenje, Slovenia⁴Central Mining Institute, Poland⁵Institute of Environmental Diagnostics and Water Studies-CSIC, Spain

Despite international efforts to limit worker exposure, coal mine dusts continue to impact the health of thousands of miners across Europe. Modern, practicable assessment tools and devices are urgently needed to protect workers, particularly from the fine fraction (PM_{2.5}), which is increasingly implicated in human disease. To predict dust toxicity of different coal mine dusts and mining scenarios, a set of toxicological assays are necessary to identify a successful improvement of risk management targeting mitigation measures. Various studies indicate that the surface area and the potential to form reactive oxidants are highly promising metrics to predict the toxic potency of fine and ultrafine dusts. In the frame of the European ROCD project, two lignite coal mine dusts with different fractions (PM_{2.5} and PM₁₀) obtained from a coal mine in Velenje (Slovenia) were investigated for their cytotoxic, oxidant generating capacity and inflammatory potential in the human alveolar epithelial cell line A549. Furthermore, to relate the observed effects to the hydroxyl-radical (OH·)-generating activities of these samples. The approach is based on the aligned Electron Paramagnetic Resonance spectroscopy (EPR) technique with 5,5-Dimethyl-1-Pyrroline-N-Oxide (DMPO) as spin trap and hydrogen peroxide as substrate, and is specifically sensitive to Fenton-type reaction mediated generation of hydroxyl radicals. The results show that the two lignite coal mine dust samples investigated induce cytotoxic effects, produce ROS and release cytokine IL-8 in a concentration-dependent manner, with a similar potency to the two reference substances quartz and Coal Fly Ash (CFA). Moreover, the toxic effects of the two coal mine dusts observed in human lung cells A549 appear to correlate with the hydroxyl-radical-generating capacities of both coal mine dust samples. The two studied coal mine samples and two reference substances with known constituents reveal the intrinsic hydroxyl-radical-generation method to be a sensitive tool for prediction of adverse health effects.

Recent Publications

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Biography

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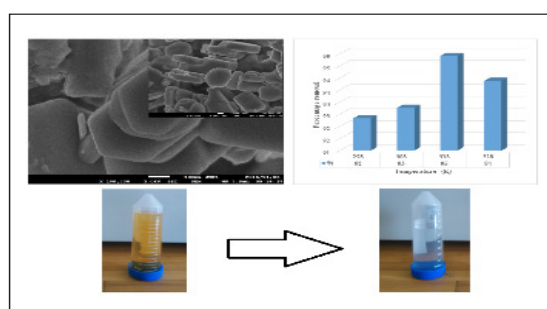
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The treatment of dye contaminated wastewater using crypto-crystalline magnesite

Tholiso Ngulube¹, Jabulani Ray Gumbo¹, Vhahangwele Masindi^{2,3} and Arjun Maity⁴¹University of Venda, South Africa²Council for Scientific and Industrial Research, South Africa³University of South Africa, South Africa⁴Council for Scientific and Industrial Research, South Africa

Discharging industrial colored wastewaters into aqueous environments can cause adverse effects on aquatic life due to the toxic nature of synthetic dyes. The present study aimed to evaluate the efficiency of using crypto-crystalline magnesite to remove an anionic dye (Methyl Orange; MO) from aqueous systems. To achieve that, several operational factors like residence time, adsorbent dosage, species concentration and temperature were appraised. The batch study proved that crypto-crystalline magnesite is effective in the treatment of MO contaminated water and moreover it performed well in terms of color removal. The removal efficiency of crypto-crystalline magnesite was found to be 85.85% for 30 mg/L of MO solution. Four different kinetic models, viz., pseudo-first-order, pseudo-second-order, intra-particle diffusion and Elovich were used to fit the kinetics data. The adsorption kinetics process primarily followed the pseudo-second-order model indicating chemisorption. The best-fitted adsorption isotherm models were found to be in the order Temkin (0.96)>Dubinin Radush Kevich (0.88)>Langmiur (0.81)>Freundlich (0.30). In accordance with the results of this study, it can be concluded that crypto-crystalline magnesite can be used effectively for the adsorption of methyl orange in wastewater and thus can be applied to treat wastewater containing dyes.



Recent Publications

1. Ngulube T, Gumbo J R, Masindi V and Maity A (2017) An update on synthetic dyes adsorption onto clay based minerals: A state-of-art review. *Journal of Environmental Management*; 191: 35-57.
2. Masindi V, Ngulube T and Gitari W M (2015) Kinetics and equilibrium studies for removal of fluoride from underground water using crypto-crystalline magnesite. *Journal of Water Reuse and Desalination*; doi:10.2166/wrd.2015.080.

Biography

Tholiso Ngulube has completed her PhD in Environmental Sciences from the University of Venda in South Africa. She is a Member of the Water Institute of Southern Africa. She has also published articles in international peer reviewed journals and has also attended various international conferences in the environmental sciences field. She has been serving as a Core Lecturer at Applied Centre for Climate and Earth Science Systems (ACCESS) and is also a Tutor and Mentor at the University of Venda.

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September 17-18, 2018 Singapore

Effects of cognitive ability of environmental hormones of elementary teachers on in-service learning enhancement**Fu Chi Chuang, Yu-Liang Chang and Wen-Der Wang**
National Chiayi University, Taiwan

With the development of industry and technology, we enjoy the convenience of civilized products. However, we develop the civilization also brings the environmental crisis, pollutions. An environmental hormone (also called endocrine disruptor) which is a category of chemical compounds that resemble endocrine hormones and it is one of the most notable pollution categories. These compounds are able to activate the same endocrine receptors as their natural counterparts and can thus disrupt hormonal activity, which impairs our health and our ecosystem homeostasis. In order to remind people realize the potential problem and how to protect our environment from the pollutions when we are developing new products for our convenience. We believe that environmental education is the way to bring our mission into reality. Questionnaire survey was performed to analyze the cognition ability of environmental hormones of elementary teachers and further study the relationship between it and the motivational enhancement of in-service learning on the knowledge of environmental hormones. Complete questionnaires were collected from 128 elementary teachers and the result indicates most elementary teachers lack sufficient knowledge of environmental hormone (the passing point was set up at 70 point). Our result also reveals the in-service learning motivation of elementary teacher is positively enhanced once they realized their insufficient cognitive ability of environmental hormones. We hope our study provides the powerful reference for Ministry of Education to set up the policy of environmental education to enrich all citizens sufficient knowledge of the effects of environmental hormone on organisms and further to enhance our correct environmental behaviors.

Biography

Fu Chi Chuang is a graduate student of Institute of Educational Administration and Policy at National Chiayi University. Her study focuses on the elementary school teachers' in-service training policy. She also pays close attention to the environmental hormones that risk human health.

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September 17-18, 2018 Singapore

Toxicity response of aquatic bio-indicators exposed to water polluted with glyphosate

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Herbicides based on glyphosate ($C_3H_8NO_5P$ / CAS 1071-83-6) have been used (actually close to 150 million kg/year) since 1974 on crop soils to eliminate invasive plant species. Sources water can be reached by this herbicide through runoff, leaching and direct exposure of the water receiving body by aerial application. On aquatic environmental, the glyphosate has been found at concentrations up to 4.0 $\mu\text{g/L}$. Despite the glyphosate has been designed to be lethal in plants (inhibition of the shikimate pathway), the presence of surfactants from commercial formulations and metabolites formation (e.g. Aminomethylphosphonic Acid or AMPA) by biodegradation could change its toxicity on organisms aquatic. The aim of this work was the eco-toxicological evaluation of freshwater and marine water polluted with glyphosate on *Daphnia magna*, *Emerita analoga* and *Tisbe longicornis*. The methodology used the exposition the aquatic organisms to GLIFOPAC (480 g/L of active ingredient) at concentrations between 0.5 and 4.8 g/L of active ingredient. The acute toxicity of *D. magna* (48 hours $-LC_{50}$), *E. analoga* (48 hours $-LC_{50}$) and *T. longicornis* (96 hours $-LC_{50}$) were studied. Moreover, chromatographic analysis of freshwater and marine water polluted with glyphosate was evaluated. Results demonstrated that acute toxicity reported values for *D. magna*, *E. analoga* and *T. longicornis* of 27.4, 806.4 and 19.4 mg/L, respectively. Chromatographic analysis described around 45 substances of the GLIFOPAC composition such as structures from the surfactants (aliphatics chain with ester/ether group), metabolites (AMPA) and other substances (glucofuranose, glucoopyranoside, galactopyranose). Preliminary assessments showed differences in the glyphosate composition within the freshwater and marine water, which may influence the toxicity in each aquatic environment.

Recent Publications

1. Villamar C A, Silva J, Bay Schmith E and Vidal G (2014) Toxicity evaluation identification of anaerobically treated swine slurry: A comparison between *Daphnia magna* and *Raphanus sativus*. *Journal of Environmental Science and Health: Part: B*; 49(11): 880-888.
2. Villamar C A, Cañuta T, Belmonte M and Vidal G (2012) Characterization of swine wastewater by toxicity identification evaluation methodology (TIE). *Water Air and Soil Pollution*; 223(1): 363-369.

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Biography

Soledad Chamorro has her expertise in Toxicology Evaluation (lethal, sublethal, chronic and metabolic) through bio-indicators and biomarkers as algae, microcrustacean and fish.

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September 17-18, 2018 Singapore

Post-harvest evaluation of dimethoate, chlorothalonil and chlorpyrifos by GC-ECD in Peruvian varieties of *Chenopodium quinoa* Willd**Fredy Enrique Quispe Jacobo, Carlos Medina Saldivar and Chirinos Pajuelo Diego**
National Institute of Agrarian Innovation, Peru

Chenopodium quinoa is an important nutritional Andean grain produced by farmers in Peruvian highlands and Plateau. In the last years, new crops like *quinoa* in Peruvian coast have been cultivated due to increasing of worldwide demand of *quinoa*. However, the growing under this agro climatic condition, *quinoa* was more sensitive to plague attacks and fungus infection, for those reasons farmers increasing the use of pesticides, which in many cases exceeded the maximum residue limits established by international organizations in food and feed. The purpose of this study was the post-harvest evaluation of dimethoate, chlorothalonil and chlorpyrifos by Gas Chromatography coupled with Electron Capture Detector (GC-ECD) using a solid phase extraction in seeds of four varieties of Peruvian *quinoa*. The study began with the development, optimization and validation of the method for determining the levels of dimethoate, chlorothalonil and chlorpyrifos in the post-harvest stage of Salcedo, Quillahuaman, Santa Ana and Altiplano *quinoa* varieties, which were harvested in conventional and organic field at the central coast of Peru (Lima). Validation by GC-ECD shows pesticides recovery percentages between 98.98 and 118.44% with relative standard deviation up to 10.5%, significant correlation coefficients (≥ 0.9979) and limits of quantification (≥ 5.402 ppb) were observed in the *quinoa* seeds, which meet the standard validation parameters of the European commission. The evaluation of chlorothalonil in Quillahuaman and Santa Ana at conventional field exceeded the maximum residue level allowed, however three months later the concentration of the pesticides used in the culture decreased significantly. In the case of organic field the pesticides were not observed. The gas chromatography coupled with electron capture detector can be used to determine the levels of dimethoate, chlorothalonil and chlorpyrifos in *quinoa* seeds. Recommendations are to determine the levels of these pesticides in the Peruvian market.

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2. Ortega Barriga R E, Zamallora Cuba W A, Tornisielo V L, Zirena Vilca F (2016) Determination of organo-chlorine pesticides in organic *quinoa* grains (*Chenopodium quinoa* Willd) by GC- μ ECD, using the QuEChERS method. Revista de Investigación Altoandina; 18 (1): 19-26.

Biography

Fredy Enrique Quispe Jacobo is a researcher from National Institute of Agrarian Innovation (INIA). He has expertise in Researching and Technological Development (RTD) of Natural and Agro industrial products. He is a leader of Nutritional Area from Genetic Resources and Biotechnology Division at INIA, and with his team executes Projects to know the nutritional contents, minerals, and functional properties of genetic resources, likewise pesticide residuals used in the production at field.

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September 17-18, 2018 Singapore

Amitraz changes 5-HT levels mediated by alterations in estradiol content in CNS of male ratsJavier Del Pino¹, Matilde Ruiz¹, María Jesús Díaz¹, Gloria Gomez¹, María José Anadón¹, Margarita Lobo¹, José Manuel García¹, María Teresa Frejo¹ and Jimena García²¹Complutense University of Madrid, Spain²Universidad Alfonso X El Sabio, Spain

Amitraz is a formamidine insecticide/acaricide that alters different neurotransmitters levels, among other neurotoxic effects. Oral amitraz exposure (20, 50 and 80 mg/kg bw, 5 days) has been reported to increase Dopamine (DA) content and to decrease its metabolites and turnover rates in the male rat brain, particularly in the striatum, prefrontal cortex and hippocampus. However, the mechanisms by which these alterations are produced are not completely understood. Amitraz alters estradiol concentrations in the brain that regulate the enzymes responsible for this neurotransmitter synthesis and metabolism. Thus, alterations in estradiol levels in the brain could mediate the observed effects. To test these hypothesis regarding possible mechanisms, we treated male rats with 20, 50 and 80 mg/kg bw for 5 days with or without tamoxifen (TMX, 1 mg/kg bw), a selective estrogen receptor antagonist and then isolated tissue from striatum, prefrontal cortex and hippocampus. We then measured tissue levels of DA neurotransmitter. Amitraz produced a dose-dependent increase of the DA levels in all brain regions studied compared to the control group. The increase in DA ranged from highest to lowest in prefrontal cortex, striatum and hippocampus. Moreover, amitraz induced a dose-dependent decrease of DOPAC and HVA metabolites content and turnover rate (DOPAC+HVA/DA) in all brain regions studied compared to the control group. There were no differences between the decrease in the DOPAC and HVA content in the hippocampus, but the decrease in the DOPAC content was higher than the decrease in the HVA content in the striatum and the decrease in the HVA content was higher than the decrease in the DOPAC content in prefrontal cortex. The decrease of DA turnover rate (DOPAC+HVA/DA) ranged from highest to lowest in prefrontal cortex, hippocampus and striatum. TMX co-treatment with amitraz partially reversed the change in DA neurotransmitter and its metabolites levels as well as the turnover rates induced by amitraz alone in all brain regions studied. Our present results provide new understanding of the mechanisms contributing to the harmful effects of amitraz.

Biography

Javier Del Pino has completed his Doctor of Pharmacy degree from the Complutense University of Madrid in 2004. He has completed his Master's degree in Science, specialized in Neurotoxicology and Neurodevelopmental Toxicology and has completed his PhD in Toxicology. He has worked in the Institute of Health Carlos III from the National Center of Environmental Health. He was Associated Researcher at University of Massachusetts (UMASS) working in Sandra Petersen's Lab in a National Institute of Health (NIH) project on developmental effects of TCDD endocrine disruptor on sexual differentiation. In 2016 he got a position as Associated Professor of Toxicology at the Complutense University of Madrid.

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September 17-18, 2018 Singapore

Primary hippocampal neuronal cell death induction after acute and repeated Paraquat exposures mediated by glutamatergic transmission disruption**Paula Moyano¹, Javier Del Pino¹, Matilde Ruiz¹, María Jesús Díaz¹, Gloria Gomez¹, María José Anadón¹, Margarita Lobo¹, José Manuel Garcia¹, María Teresa Frejo¹ and Jimena García²**¹Universidad Complutense Madrid, Spain²Universidad Alfonso X El Sabio, Spain

Paraquat (PQ) is a widely used non-selective contact herbicide shown to produce memory and learning deficits after acute and repeated exposure similar to those induced in Alzheimer's Disease (AD). However, the complete mechanisms through which it induces these effects are unknown. On the other hand, glutamatergic systems, mainly in the hippocampus are involved on learning, memory and cell viability regulation. An alteration of hippocampal glutamatergic transmission or neuronal cell loss may induce these effects. In this regard, it has been suggested that PQ may induce cell death and affect glutamatergic transmission, which alteration could produce neuronal loss. According to these data, we hypothesized that PQ could induce hippocampal neuronal loss through glutamatergic transmission alteration. To prove this hypothesis, we evaluated in hippocampal primary cell culture, the PQ toxic effects after 24 hours and 14 consecutive days exposure on neuronal viability and the glutamatergic mechanism related to it. This study shows that PQ disrupted glutamate levels through induction of glutaminase activity. In addition, PQ induced, after 24 hours and 14 days exposure, cell death on hippocampal neurons that was partially mediated by glutamatergic transmission disruption. Our present results provide new view of the mechanisms contributing to PQ neurotoxicity and may explain cognitive dysfunctions observed after PQ exposure.

Biography

Paula Moyano has completed her JD degree from the University Complutense, the University of Madrid in 2013. She has a Masters in Pedagogical Sciences. She is specialized in neuro-toxicology and legal sciences and has completed her PhD in Toxicology and Legal Medicine.

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Accepted Abstracts

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Modulation of mercuric chloride by the combined treatment of N-acetyl cysteine and selenium: A protective approachDeepmala Joshi^{1,2}, Sadhana Shrivastava², Sangeeta Shukla² and Sunil Srivastav¹¹Deen Dayal Upadhyaya Gorakhpur University, India²Jiwaji University, India

Mercury is ubiquitous in the environment and is inevitable in both human and animals to avoid its exposure in toxic forms of mercury on a regular basis. The channel news Asia, Singapore reported that 18 recalled beauty products contains mercury and other potent ingredients exceeded permissible limit by more than 27,000 times. The aim of present study describes the protective effect of selenium either alone or in combination with N-Acetyl Cysteine (NAC) against acute mercuric chloride poisoning. The experiment was carried out in male albino Sprague Dawley rats (n=30) which was divided into 5 groups. Group 1 served as control. Groups 2-5 were administered mercuric chloride (HgCl₂; 12 µmol/kg, i.p.) once only, group 2 served as experimental control. Animals of groups 3, 4 and 5 were received N-acetyl cysteine (NAC: 0.6 mg/kg, i.p.) and selenium (Se: 0.5 mg/kg, p.o.) and NAC with Se in combination. Acute HgCl₂ toxicity caused significant rise in serum AST, ALT, SALP, LDH, albumin, bilirubin, GGT, TG, cholesterol, protein, urea, creatinine, uric acid and BUN content. Animals of toxicant exposed group also showed significantly higher mercury content in liver and kidney, significant rise in lipid peroxidation level with concomitant decrease in reduced glutathione content and the antioxidant enzyme activities of superoxide dismutase and catalase after HgCl₂ exposure. Results of the present investigation clearly showed that the combination therapy with NAC+ Se provides maximum protection against mercury toxicity than mono-therapy by preventing biological membrane from oxidative damage and metal mediated free radical attacks.

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A novel high performance liquid chromatographic method for determination of ceftriaxone in forensic matrices**Jaskaran Singh**Amity University, India
Lovely Professional University, India

An isocratic liquid chromatographic method with UV detection at 242 nm is described for determination of ceftriaxone. Chromatographic separation of drug was achieved on a hypersil ODS C-18 150*4.6 mm, 5 µm column using a mobile phase consisting of a binary mixture of phosphate buffer (4.5590 gm of potassium dehydrogenate orthophosphate in 1.0 liter water and pH was adjusted to 7.5) and methanol in the ratio of 60:40 v/v. The developed liquid chromatographic method offers symmetric peak shape, good resolution and reasonable retention time for drug. Linearity, accuracy and precision were found to be acceptable over the concentration range of 10-40 microgram/ml for ceftriaxone. The LC method can be used for the detection of ceftriaxone over dosage cases found in various forensic matrices like blood, gastric lavage, viscera and for quality control of formulated products.

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Tropical climate variability and its impacts on marine coastal ecosystems and biodiversity of plankton, southeast coast of India

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Global warming and the subsequent events of climate variability may have greater repercussions for marine ecosystems than for terrestrial ecosystems, because of temperature influences, water column stability, nutrient enrichment, biodiversity of plankton communities and its reproductive cycles. To understand the impacts of tropical climate variability on the marine coastal ecosystems, a study has been undertaken to investigate the biodiversity and abundance of plankton in the most important tropical estuarine systems, a unique coastal marine environment in south India. The cumulative long term survey showed (period from 1988 to 2015) remarkable variations in environmental parameters, chlorophyll concentrations and diversity of species in abundance of plankton communities. Besides, it showed seasonal variations being highest in summer (April-June) and lowest in monsoon (October-December). There were wide temperature fluctuations (range- 22.8-33.9 °C), salinity gradients (3.1-34.8) and chlorophyll concentrations (1.6-19.4 µg l⁻¹). The overall mean abundance of phytoplankton 3.9 fold and zooplankton 3.2 fold were higher in summer than in monsoon. The low diversity and abundance of plankton during monsoon might be due unfavorable climatological conditions, disappearance of many species, scarcity of food and high turbidity condition of the water column. The cumulative data on plankton diversity and abundance showed interesting observations on species distribution and abundance pattern. Climate variability exerts major influence on the ecosystem and biodiversity of plankton.

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September 17-18, 2018 Singapore

Anti-coccidial effect of garlic (*Allium sativum*) and ginger (*Zingiber officinale*) against experimentally induced coccidiosis in broiler chickens

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The present study was designed to find the effect of ginger and garlic on the performance and integrity of gut in experimentally induced coccidiosis in broiler chickens. A total of two hundred day-old Hubbard broiler chicks were divided into six equal groups as following- T1, control (basal diet only); T2, infected-untreated (positive control); T3, infected and supplemented with garlic at 15 g/kg feed; T4, infected and supplemented with gingers at 5 g/kg feed; T5, infected and treated with amprolium hydrochloride at 1.25 g/liter drinking water; T6, infected and supplemented with mixture of garlic and ginger at the rate of 2.5 and 7.5 g/kg feed. The results showed that feed intake, body weight and Feed Conversion Ratio (FCR) was significantly ($P < 0.05$) high in ginger and garlic supplemented birds compared to the positive control. Similarly, oocysts shedding, lesion score and histopathology of the small intestines improved in ginger and garlic supplemented birds after induced-infection in broiler. The findings of the present study showed that ginger and garlic produced encouraging results in comparison to amprolium in broiler chickens infected with experimental coccidiosis.

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18th Global Summit on

ENVIRONMENTAL TOXICOLOGY AND PHARMACOLOGY

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Potential toxic elements contamination and human health risk assessment in surface soils of an industrial area, south central Iran

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The purpose of this study was to determine the concentrations, contamination level, distribution, health risk and potential sources of heavy metals in suburban soils from industrial area in south central Iran. A total of 66 top soil samples from Bandar Abbas County south district were collected and analyzed for Cr, Cd, Pb, Zn, Cu, Ni and As using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The geo-accumulation Indexes (Igeo), Pollution Index (PI) and Pollution Load Index (PLI) were calculated to assess the pollution level in the industrial soils. The Hazard Index (HI) and Carcinogenic Risk (RI) were used to assess human health risk of heavy metals. Also, multivariate statistical analysis and Geographical Information System (GIS) were used to source identification and prepare distribution maps of heavy metals, respectively. Results showed that the contamination levels of heavy metals were in the descending order of Cu>Cd>Pb>Zn>As>Ni>Cr. Moreover, based on principal component analysis (PCA), Cd, Zn, Cu and Pb originated mainly from anthropogenic sources including power plants, oil and gas refinery, steel and zinc production factories and municipal waste landfills and suburban soils were highly polluted with these metals. For non-carcinogenic effects, Hazard Indexes (HIs) of studied metals decreased in the order of Cr>As>Cd>Pb>Ni>Cu>Zn. Arsenic, chromium and cadmium were regarded as the priority pollutants. Carcinogenic risks due to Cd and As in suburban soils were within tolerable risk to human health; however, children faced more health risk in their daily life than adults via their unconscious ingestion and dermal contact pathway. These results provide basic information of heavy metal pollution control and environment management in this industrial area.

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Geographical distribution of air pollutant and human health impacts**Tawfiq Almsatar**

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Air pollution can be defined as a condition in which the concentrations of substances in the atmosphere are high enough to cause measurable effect on man, animals, vegetation or materials. A substance, refer to particulate matter which is any natural or anthropological airborne chemical element or compound that can exist in the atmosphere as gases, liquid drops or solid particles. Particulate Matter (PM) is a not a single pollutant, but a complex mixture of many types of pollutants, it's extremely made up of acids, organic chemicals, metals and soil or dust particles, with different physical, chemical and biological characteristics, which determine both its behavior as well as its environmental and health effects. Air pollution is a pervasive public health issue with major cardiovascular and health economic consequences and it should remain a key target for global health policy. The effect of air pollution on other cardiovascular conditions has been less well described. The World Health Organization (WHO) reported that ambient air pollution was responsible for 3.7 million deaths in 2012, representing 6.7% of total deaths worldwide and was the cause of 16% of lung cancer deaths, 11% of chronic obstructive pulmonary disease related death, 29% of heart disease and stroke and approximately 13% of deaths due to respiratory infection. This article will discuss the source of particulate matter air pollutants, the geographical distribution and its human health impact.

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