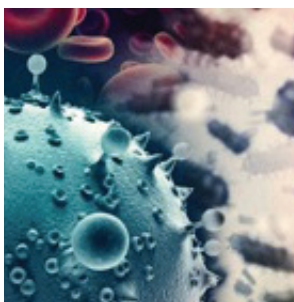
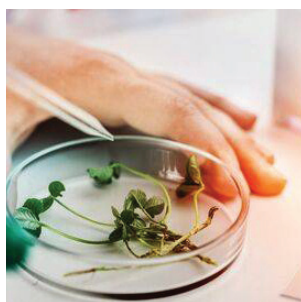

Video Presentation

Toxicology 2019



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The effect of hard drinking water with elevated concentrations of Calcium or Magnesium on Renal functions and metabolism in rats

Aizman Roman Idelevich

Novosibirsk State Pedagogical University, Russia

There are conflicting data in the literature on the impact of hard drinking water, due to the high content of magnesium or calcium salts, on various organs and systems. In connection with the above, the aim of this work was to study the effects of prolonged consumption of drinking water with high content of ions Ca^{2+} or Mg^{2+} on hydro- and ionuretic renal functions and biochemical parameters of blood plasma in Wistar rats. 3 groups of animals were studied: control animals on standard feed and water consumption ($\text{Ca}^{2+} = 20 \text{ mg/dm}^3$; $\text{Mg}^{2+} = 6 \text{ mg/dm}^3$); and 2 experimental groups, consuming for 5 weeks water with an increased concentration of Ca^{2+} (120 mg/dm^3) or Mg^{2+} (70 mg/dm^3). Renal function was studied by collecting background urine samples within 4 hours and 3 hours after oral 5% of body weight water load. At the end of the experiment, blood was collected to assess the homeostatic parameters of plasma. The concentrations of electrolytes and osmotically active substances in urine and plasma were determined using the methods of flame photometry and cryoscopy. Calculation of water and ionic renal functions was carried out according to the generally accepted formulas. Set of indicators characterizing the rat's response to long-term drinking water intake with a high content of Ca^{2+} or Mg^{2+} , leads to the conclusion that after 5 weeks of such water consumption there was an activation of osmo-regulatory mechanisms in both experimental groups.

The difference between the ion-regulating indicators in experimental groups compare to control was expressed to a greater degree following the consumption of drinking water with a high magnesium content. Water loadings reduced the stress of osmo- and ion-regulating mechanisms, probably due to increase of dilution process. These results indicate the influence of surplus cations intake on osmo- and ion-regulating mechanisms of water-mineral balance.

Biography

Aizman Roman Idelevich, is a Doctor of Biological Sciences, Professor, Honored Worker of Science of Russia, Head of the Department of Anatomy, Physiology and Safety, Director of the Institute of Health and Safety. He is a member of 3 dissertation councils for doctoral theses, a foreign member of the American Physiological Society, a valid Member of the European Society of Pediatric Nephrology, associate editor of two scientific journals. Under his leadership 8 doctoral and 40 candidate's theses on problems of developmental and renal physiology, physiological-hygienic effects of drinking water were defended. He is a author of over 500 scientific and methodical works, including 28 monographs, 90 manuals, 367 articles in refereed journals and 16 proposals, patents, registration certificates. He is awarded diplomas of the Ministry of Education of the Russian Federation, Ministry of Emergency Situations, the Administration of the city and region (Novosibirsk) the Medal "Property of Siberia", K.D. Ushinsky medal.

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 Notes:

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Assessment of Mercury and organochlorine pesticides concentration in turtles in the Xingu River Basin, Brazil

Marina Teófilo Pignati

Federal University of Amapá, Brazil

Due to the toxicity and high environmental persistence of organochlorine pesticides and mercury in aquatic organisms, turtles have been studied as environment biomonitors. These animals are important sources of protein for the riverside and indigenous peoples of the Brazilian amazon. Organochlorine pesticide and mercury contamination was investigated in *Podocnemis unifilis*. Liver, muscle and fatty tissue samples were removed from 50 specimens collected from five sampling points located in the Xingu River basin, Brazil, and the total mercury (THg) and organochlorine pesticides were analysed. Eight organochlorine pesticides were detected with average concentrations of Σ DDT, Σ Endosulfan and Σ HCH which were 26.17 ± 26.35 , 14.38 ± 23.77 and 1.39 ± 8.46 ng g⁻¹ in moisture content, respectively. DDT compounds were the most predominant, with a greater concentration of pp'-DDT in the liver and pp'-DDD in the muscle. Significant differences were noted between the types of tissues studied, and the concentration of OCPs varied between sampling sites. The

liver and muscle samples contained 134.20 ± 119.30 ng.g⁻¹ THg and 24.86 ± 26.36 ng.g⁻¹ THg, respectively. Each chelonian or meal has, on average, 5.34x more Hg than the highest level established as acceptable. From the results it can be inferred that, given the weekly consumption of chelonians, the riverine and indigenous communities in the Xingu River Basin in Brazil are at risk of chronic consumption of Hg in amounts beyond the acceptable limit. The potential high risk to the health of this population is evident; however, the risk classification needs to be further studied.

Biography

Marina Teófilo Pignati is graduate at Biology from Universidade Federal de Mato Grosso (2008), Master's in Zoology (2011) and has completed her PhD in Zoology from Universidade Federal do Pará, Brazil (2017). She is professor of Universidade Federal do Amapá, Brazil. She has publications and experience in Zoology, acting on the following subjects: Herpetology; Amazon turtle; Reproductive ecology; Ecotoxicology; Pesticides and metals.

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 Notes:

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Brazilian natural products as a promising medicine for the treatment of inflammatory diseases and its nanoformulation

Luzia Kalyne Almeida Moreira Leal

Federal University of Ceará, Brazil

During the development of new bioactive materials as tools for therapeutic use, one of the key questions is to understand how they interact with biological systems. In this way, it is essential to describe the mechanism of action aiming to understand how these materials induce their pharmacological effects and if these actions may cause health risks. New materials such as nanoparticles have attracted the attention of academy and industry. In particular, in Brazil we have researched several plant extracts and free or nanoencapsulated molecules for the treatment of inflammatory diseases using experimental models *in vitro* and *in vivo*. We have investigated the anti-inflammatory effect and toxicity of plant products, including imidazole alkaloids (Epiisopiloturine (EPI) and epiisopilosine (EPIIS) from *Pilocarpus microphyllus* Stapf), eugenol (a free or nanoencapsulated terpene) and dry extract of *Amburana cearensis* (microparticles). The EPI and EPIIS are side products in the Brazilian pharmaceutical industry which showed anti-inflammatory and antioxidant activities. Both alkaloids inhibited the degranulation of activated human neutrophils. This effect was accompanied by the reduction of ROS, the prevention of the increase of intracellular Ca²⁺ and decrease of the density of cytosolic NF- κ B, and inhibition of TNF- α and IL-6 production. The EPI and EPIIS also inhibited carrageenan-induced inflammatory hypernociception in mice and reduced myeloperoxidase (MPO) levels. Eugenol (EUG) is a terpene present in essential oils of plants which has attracted attention due to its anti-inflammatory properties, as well as antioxidant effect. Despite of these pharmacological properties it presents irritant effect on skin which limit its use in topic, such as for treatment of dermatitis. To overcome it, we developed eugenol- loaded polymeric

nanocapsules. The EUG, inhibited the ROS production in human neutrophil, but it was toxic in human keratinocyte and did not interfere with ear edema induced by TPA in mice. However, the nanocapsules of EUG (NCEUG) prevented its cytotoxicity in keratinocytes, and reduced ear thickness of mice (experimental model of dermatitis) reducing the MPO activity and the concentrations of IL-6 and KC (CXCL 1). Together, these results showed that NCEUG promoted a reduction in cytotoxicity of EUG and improved its anti-inflammatory effect. Parkinson's and Alzheimer's Disease are neurodegenerative diseases which neuroinflammation has an important role. Microglia is part of the innate immunity of central nervous system, being its activation one of the main mechanisms of inflammation responses. The standardized dry extract of *A. cearensis* (actives markers: coumarin and amburoside) reduced LPS-stimulated nitrite release on microglial and reduced the expression of iNOS (Western blot analysis). These findings suggest that molecules and/or plant extract from Brazilian medicinal plants, and its nanoencapsulation possess promising anti-inflammatory potential acting through the modulation of inflammatory response appear non-toxic.

Biography

Luzia Kalyne Almeida Moreira Leal is pharmacist and received her PhD in Pharmacology from the Federal University of Ceará, Brazil in 2006. She is Pharmacognosy professor at Federal University of Ceará since 1996. Her research interests are in Pharmacognosy and Pharmacology of Natural Products for the development of new medicines to treat inflammatory diseases. She is founder and coordinator of the Center of Pharmaceutical and Cosmetics Studies.

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 Notes:

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Scorpion toxins as drug and pharmacological tolls candidates

Elisabeth Ferroni Schwartz

University of Brasilia, Brazil

Scorpions are known for their dangerous stings that can result in severe consequences for humans, including death. Neurotoxins present in their venoms are responsible for their toxicity, and due to their medical relevance, toxins have been the main motive for scorpion toxins research field. On the other hand, for thousands of years, scorpion venoms have been applied in traditional medicine, mainly in Asia and Africa. With the advent of novel methodologies for the massive study and characterization of venom components, several drug candidates have been found with the potential to tackle many of the emerging global medical threats. Scorpions have become a valuable source of biologically active molecules, from novel antibiotics to potential anticancer therapeutics. Due to their pharmacological action on ion channels and their clinical relevance,

neurotoxins have drawn attention as useful scaffolds for the development of drugs, and new pharmacological tolls. Most of the knowledge about the structure and functioning of ion channels was obtained using animal toxins that modulate these membrane proteins, especially scorpion toxins. This talk will summarize the scorpion toxins that are the most promising candidates for drugs and pharmacological tolls.

Biography

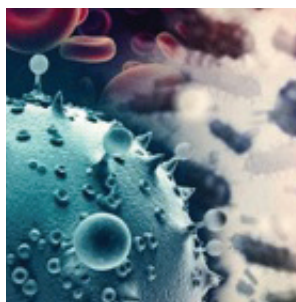
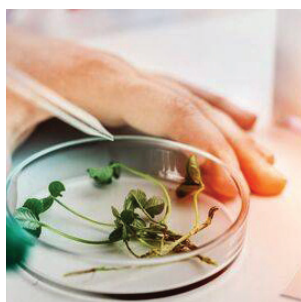
Elisabeth Ferroni Schwartz has completed her PhD from São Paulo University, SP, Brazil. She is professor of University of Brasilia, DF, Brazil. She has over 60 publications that have been cited over 1200 times, and her publication H-index is 21. Her main research subjects have been scorpion toxins, and ion channel modulators.

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 Notes:

Poster

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Characterization and evaluation of the GG polymer to regulate intestinal motility in Hemiparkinsonism rat model

Ehekatzin García Valdés

Instituto Politécnico Nacional, México

Parkinson's disease (PD) is usually characterized by cardinal motor impairments. However, a range of non-motor symptoms precede the motor-phase and are major determinants for the quality of life. To date, no disease modifying treatment is available for PD patients. The gold standard therapy of levodopa is based on restoring dopaminergic neurotransmission, thereby alleviating motor symptoms, whereas non-motor symptoms remain undertreated. Constipation is a problem that affects approximately 50-70% of people with Parkinson's disease (PD) due to alterations in the autonomic nervous system (ANS), which regulates involuntary movements of the digestive tract. In this regard, it has been reported that the administration of soluble and insoluble fiber improves the symptoms of idiopathic chronic constipation. Guar gum (GG) is a polymer of relatively recent use, derived from the seeds of the *Cyamopsis tetragonoloba* plant from the Leguminosae family. GG has proven to be effective in softening and improving faecal production and

increasing the capacity of faeces load and sensation of faecal excretion. Amaranth grain (AG) has unique protein content. Due its composition, amaranth protein resembles the one found in milk products and it is very close to the ideal protein characteristics proposed by the Food and Agriculture Organization (FAO) for human consumption. The purpose of this paper is to propose a product which chemical properties will contribute to increase the peristalsis.

Biography

Ehekatzin García Valdés is a biotechnology engineer, currently studying the master's degree in Advance Technology at the Instituto Politécnico Nacional in a collaboration with Univesidad Nacional Autónoma de Mexico, where he is developing an alternative for the treatment of chronic constipation suffered by patients with Parkinson's disease. He has experience in the development of functional foods, protein extraction and physical characterization.

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 Notes:

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Partial characterization, efficacy tests, clinical and histological evaluation of a plant species (Montanoa) in the process of healing superficial wounds in Murine model

Galaviz Hernández Stephania

Instituto Politécnico Nacional, México

Healing and regeneration processes take place in all parts of the human body, while regeneration describe the specific substitution of the tissue, i.e. the superficial epidermis, mucosa, skin repair displays an unspecific form of healing in which the wound heals by fibrosis and scar formation. Rats and mice represent an ideal preclinical model to study new products. However, wound healing in a mouse is fundamentally different to that of humans where the repair process is then dependent on epithelialization, cellular proliferation and angiogenesis, which closely mirror the biological processes of human wound healing, allows for testing of promising agents that may promote rapid healing like *Montanoa Grandiflora*, which have been considered as promising systems of phytopharmaceutical administration by the pharmaceutical industry, mainly

because they are biocompatible, available in nature, non-toxic and economical in its elaboration in order to satisfy the demand presented today. Healing of skin wounds is a highly complex process aimed at recovering the integrity of the tissue, allowing its regeneration and restoring its functions.

Biography

Galaviz Hernández Stephania is a Biotechnology Engineer and currently studying the master's in advanced technology at the Instituto Politécnico Nacional. He has done bioinformatics studies developing three - dimensional models of the variation in the allele - specific expression in the developing mammalian heart and he is also currently involved in the investigation of phytopharmaceutical to assess its healing power in superficial, deep wounds and diabetic foot ulcers.

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 Notes:

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November 04-05, 2019 | Prague, Czech Republic

Efficacy tests and histological evaluation of a herbal product (VGH) in a rat model

Verónica Edith Gallegos-Hernández

Instituto Politécnico Nacional, Mexico

The most common causes of peptic ulcers disease and its complications are *Helicobacter pylori* infection and the use of nonsteroidal anti-inflammatory drugs (NSAIDs). In Mexico there are more than 300 records of medications that contain the active substance called paracetamol and 68% of the Mexican population that self-medicates, does so with NSAID's. As 80% of the population admits having presented symptoms such as inflammation and abdominal distension, gastric acidity, bad breath and in some cases reflux at some point of their lives. We propose the use of VGH, an herbal product whose obtaining is fast, easy and economical. The purpose of this study was to perform the characterization of the VGH product, efficacy tests in mice and histological evaluations in liver, heart, lung, kidney and spleen. The characterization of VGH was carried on through some physiochemical test such as FTIR, optical absorption, HPLC screening and a phytochemical screening. The FTIR analysis showed the presence of specific functional groups: (1) 1000 - 1200 cm^{-1} (C-O-C); (2) 1600- 1730 cm^{-1} (C=O); (3) 2850 – 2930 cm^{-1} (-CH₃, -CH₂-, =CH-); (4) 338-3920 cm^{-1} (OH). The phytochemical screening revealed the presence of the following groups of molecules: catechins, sesquiterpenlactones, naphthaquinones and

anthraquinones. VGH increases significantly the platelet levels in blood, improving the coagulation process. When administering VGH, the gastric mucosa morphology, esophagus, mucous membrane of stomach and intestinal villi showed normal morphology characteristics after VGH treatment. The administration of the erosive agent caused the destruction of the gastric mucosa allowing the release of red blood cells to the lumen of the organs studied, promoting the migration of leukocytes to the área. The use of GAHV as a repair agent against previous damage was evident and we can said that fulfilled the expectations since, despite having been administered the erosive agent for 14 days at a dose of 0.2 mg / mL / rat / day, the histological analysis showed the preservation of the normal morphology of the tissue.

Biography

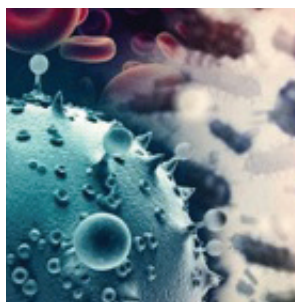
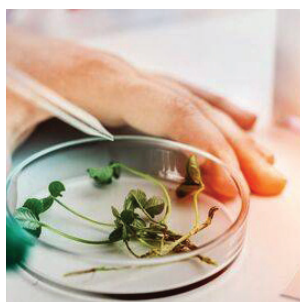
Verónica Edith Gallegos-Hernández is a biotechnological engineer from the Instituto Politécnico Nacional who has worked in the remediation of soils contaminated with fossil fuels to improve the wellbeing of her conational. For her master's degree, her research is focused on the field of gastric diseases, specifically in the erosions of the digestive tract caused by environmental factors.

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Accepted Abstracts

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A novel antitumor protein from *Calloselasma rhodostoma* venom in Vietnam

Kiem X Trinh

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Introduction: There are over thirty thousand of snakebite victims annually in Vietnam (VN). Two venomous snake families cause the big medical problem. In this, *Calloselasma rhodostoma* (CR) is the most dangerous snake of viperidae. Therefore, since 2001, the scientific research collaboration between VN and University of Southern California (USC) has been established and approved by VN government. The aim of the 1st project was determined the technological process for purification of disintegrin from CR venom of VN (CRd.VN), looking for a new candidate drug of cancer treatment.

Method: The process of collection, lyophilization of CR venom from VN. Its protein concentration was determined by BCA assay. High Performance Liquid Chromatography (HPLC), SDS-PAGE, Mass spectrometry (MS) analysis and sequencing by tryptic digestion were used for purification of CRd.VN and determined its molecular weight (MW) and

structure. Standard cell biological methods were employed to characterize CRd's abilities (*in vitro*) to inhibit platelet aggregation, adhesion, migration and invasion of tumor cells. The anti-cancer activities of CRd.VN in the breast cancer (BC) of mice model (*in vivo*) were tested.

Results: The peak No 7 of HPLC (CRd.VN) showed a single (MW \approx 10 kDa) band on SDS-PAGE gel. CRd.VN's MW was 7.33 kDa. Its molecular structure and the sequence were a monomer, containing 68 amino acids with RGD motif (position 49-51) and 6 disulfide bonds. The anticancer activities of CRd.VN were very strong and safe.

Conclusion: We have shown that CRd.VN is a possible anti-tumor agent with clinical potential. The next step for CRd.VN recombinant production, preliminary pharmacokinetics, and toxicological properties are opening before coming to a preclinical trial course.

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Biodiversity, application of Bioenergy for energy systems or materials and environmental sustainability: Sustainable energies future perspective through energy efficiency development

Abdeen Mustafa Omer

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The demand for energy continued to outstrip supply and necessitated the development of biomass option. Residues were the most popular forms of renewable energy and currently biofuel production became much promising. Agricultural wastes contained high moisture content and could be decomposed easily by microbes. Agricultural wastes were abundantly available globally and could be converted to energy and useful chemicals by a number of microorganisms. Compost or bio-fertiliser could be produced with the inoculation of appropriated thermophilic microbes which increased the decomposition rate, shortened the maturity period and improved the compost (or bio-fertiliser) quality. The objective of the present research was to promote the biomass technology

and involved adaptive research, demonstration and dissemination of results. With a view to fulfill the objective, a massive field survey was conducted to assess the availability of raw materials as well as the present situation of biomass technologies. In the present communication, an attempt had also been made to present an overview of present and future use of biomass as an industrial feedstock for production of fuels, chemicals and other materials. We may conclude from the review paper that biomass technology must be encouraged, promoted, invested, implemented, and demonstrated, not only in urban areas but also in remote rural areas.

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Phytochemical screening and toxicological study of *Aristolochia baetica* linn roots: Histopathological and Biochemical evidence

Mohammed Bourhia

Hassan II University, Morocco

A*ristolochia baetica* (*A. baetica*) is a wild species of Aristolochiaceae family, its roots are used by Moroccan people against cancer for many years ago. The objective of the study was to investigate the phytochemical screening, acute and subacute toxicity of *A. baetica* roots growing in the north of Morocco. qualitative and quantitative analysis of *A. baetica* roots were performed using standard methods, the acute toxicity of the roots extract of the studied plant was assessed in mice by gavage of single doses of 1, 2, and 4 g/kg body weight for 14 days, by the time the subacute toxicity was done using repeated doses 1, 1.5 and 2 g/kg/day for 28 days. Histological changes, biochemical parameters as markers of kidney and liver function were evaluated. The results of phytochemical screening showed the presence of polyphenols, tannins, alkaloids, flavonoids, saponins, and the absence of

anthraquinones, sterols, and terpenes. The results of acute toxicity showed the absence of mortality and signs of toxicity in groups treated with 1 and 2 g/kg, however, the clinical signs of toxicity were important and rate of mortality was estimated at 16 % in the group treated with 4 g/kg. the results of subacute toxicity showed several changes of serum parameters registered in groups treated with 1.5 and 2 g/kg/day respectively. The results should also the absence of histological injuries in groups treated with 1 and 1.5 g/kg/day, meanwhile, the histological alterations were remarkable in treated group with the highest dose administered of 2 g/kg/day. The outcome of this work showed that the roots extract of the studied plant was toxic in mice with repeated doses, but no toxic effect was observed with a single dose under 4g/kg.

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 Notes:

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Environmental hazards of Photovoltaic perovskites

László Forró

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The $\text{CH}_3\text{NH}_3\text{PbI}_3$ perovskite, is currently the most promising compound in photovoltaic (PV) technologies for making highly efficient solar cells because of their simple fabrication procedure, low price, and high efficiency. Several companies are already building perovskite-based PV devices for commercialization in the near future. Nevertheless, the perovskite contains Pb, and safety concerns during PV fabrication and transportation have not yet been addressed. But not only direct human exposure is an issue, but its release into the environment, soil and waterways, after failure of large area solar cells also represents major health risks. Here an extensive

toxicity study of the most promising photovoltaic perovskites $\text{CH}_3\text{NH}_3\text{PbI}_3$ and $\text{CH}_3\text{NH}_3\text{SnI}_3$ are presented. On cell cultures, the zoom-in *in vitro* (modification of the genes upon perovskite exposure, biochemical changes, various assays) and on living organisms (C-elegans and Drosophila) the zoom-out *in vivo* studies both show a high level of toxicity. The results are conclusive and encouraging the scientific community to conduct further tests on more complex organisms, but also to search for new materials which do not represent risk to the environment.

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Long-Fibre carbon nanotubes induce Sporadic Pleural Mesothelioma recapitulating Human Disease: A role for epigenetic mechanisms in disease development

Joaquin Zacarias-Cabeza
University of Cambridge, UK

Exposure to asbestos fibres causes pathological changes in the pleural cavity, including malignant mesothelioma. Length-dependent retention of asbestos fibres in the pleural cavity is crucial for disease development. Chronic inflammation induced by biopersistent pathogenic asbestos fibres plays a key role in carcinogenesis. Use of manufacture carbon nanotubes (CNT) is growing which increases occupational exposures of these materials. Manufactured carbon nanotubes (CNT) are similar to asbestos in terms of their high aspect-ratio and thus may pose an asbestos-like inhalation hazard; however, the molecular mechanisms underlying CNT toxicity and carcinogenic potential have not been sufficiently explored. Epigenetics is one area of interest that has been quickly developing to assess disease processes due to its ability to change gene expression and thus the lung environment after exposure. Using a mouse model of direct injection of long asbestos fibres and long-CNT into the pleural cavity, we compared the molecular changes in the mesothelium induced by these fibres over prolonged exposure times following injection.

We show a common molecular signature in the molecular changes induced by long-CNT and long asbestos throughout disease progression leading to the development of sporadic malignant mesothelioma. Our transcriptome analysis shows that gene expression profiles are similarly altered in the presence of long-CNT and long asbestos, compared to control mice at matched exposure times. Epigenetic changes induced by pathogenic fibres (long-CNT and asbestos) occur at the pre-neoplastic stage of disease and may play a key role in progression of pleural inflammatory lesions to malignant mesothelioma. Together, these data demonstrate that exposure to long-CNT induces development of sporadic pleural mesothelioma replicating the pathogenesis of human disease and highlights commonality in the hazard mechanism of long pathogenic fibres at the molecular level. Crucially, our findings reinforce concerns that high aspect-ratio CNT may pose an asbestos-like hazard, leading to malignant mesothelioma.

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Concentration of Copper (Cu) in Tinfoil Barb Fish (*Barbonymus schwanenfeldii*) of Kuantan River and Pinang River, Pahang, Malaysia

Nadzifah Yaakub

Universiti Sultan Zainal Abidin, Malaysia

The study was conducted to determine of copper (Cu) in muscle tissue of Tinfoil Barn Fish (*Barbonymus schwanenfeldii*) and surface water at Kuantan River and Pinang River, Pahang. The study also determine the water quality parameters and water quality index (WQI). The fish was caught by using gill net and they were digest using acid digestion method and analysed by Inductive Coupled Plasma Micro Spectrometer (ICP-MS). The mean concentration of Cu in fish muscle was 0.5070 ± 0.01748 mg/kg for Kuantan River and 0.4732 ± 0.01807 mg/kg for Pinang River which below the permissible limit set by Malaysia Food Act (MFA) and Food and Agriculture Organization (FAO). Cu concentration were 0.0052 ± 0.0004390 mg/kg in Kuantan River and $0.0017 \pm$

0.00006669 mg/kg in Pinang River. The level of Cu in both rivers were not harmful to the fish as the concentrations are below the permissible limit set by US Environmental Protection Agency (USEPA) and National Water Quality Standard (NWQS). There was no significant difference ($p < 0.05$) in the concentration of muscle tissue for Cu between rivers. In contrast, there showed a significant difference ($p < 0.05$) in the concentration of Cu in water between rivers. Kuantan River and Pinang River have been classified in Class II according to the Department of Environment (DOE) that the water must require conventional treatment for water supply purpose.

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 Notes:

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CH₄ capture and sequestration for feed, food and farm facilities - The Southeast Asian experience

Nervy C Santiago, DVM

Asia-Pacific Biogas Alliance, Singapore

Agriculture and Food production is the biggest contributor of anthropogenic greenhouse gas. While this has not caught the limelight as car emissions in the cities have done in the recent past, its effect on climate change is certainly significant. Because countries in Southeast Asia are developing, there is tremendous pressure on both sides. On one side there is the pressure to produce more energy to power industry. But as the demand for energy increases, the price per kilowatt hour also gets higher. In the Philippines for example, the high price of electricity (highest electricity rate in Southeast Asia) has also affected growth of the economy. While the region is busy on increasing development, the population in these developing countries are also increasing. On the other side of growth there is also a corresponding pressure to manage waste – the constant co-

product of development. There is now way of going around this cycle, more development means more production. More production means more people. More people produce even more waste. And the more waste that is produced, the bigger the carbon footprint globally. This paper examines the strategies, pitfalls and success stories of how the Southeast Asian region in general have tried to mitigate Carbon dioxide emission by sequestering Methane a more powerful greenhouse gas and constant co-product of food production. This experiential narrative will give listeners a comprehensive background of what solutions has worked in the region and also those technologies that had failed miserably. It can serve as a model for other tropical regions to follow.

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 *Notes:*