

Australian Centre for Human Health Risk Assessment

ACHHRA newsletter

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Welcome to the inaugural edition of the ACHHRA newsletter which will be published quarterly.

ACHHRA is a consortium of four Australian Universities with expertise in human health risk assessment.

ACHHRA is hosted by the Department of Epidemiology & Preventive Medicine, Monash University, and partners are the Department of Environmental Health, Flinders University; National Research Centre for Environmental Toxicology (EnTox), University of Queensland; and School of Environmental Studies; Griffith University.

The main focus of ACHHRA's risk assessment capabilities are around human exposures, or potential exposures, to hazardous chemicals and microorganisms arising from environmental or occupational media (air, water, soil, or food, or a combination of these routes). The main objectives of ACHHRA is to bring a multidisciplinary approach to health risk assessment, with access to expertise in epidemiology, toxicology, environmental sciences, analytical chemistry, microbiology, communicable diseases, clinical evaluation, and biostatistics.

The purpose of this newsletter is to provide regular alerts to some current issues in health risk assessment. Some key recent published papers will be summarised, along with other information on meetings, symposia or other issues relating to topics in human health risk assessment of environmental exposures to chemicals and contaminants.

<http://www.med.monash.edu.au/epidemiology/achhra/>

Upcoming Events and Conferences

1st International Symposium: Nano-Toxicology 2006 (Biomedical Aspects)

Miami (Florida) January 29 – February 1, 2006
Venue: Wyndham Hotel, Miami Beach Florida
Link to <http://www.pitt.edu/~nanotox/>

Program includes

- *Toxicology of nanoparticle:*
- *Toxicity of purified and non-purified nanomaterials, oxidative stress and antioxidants*
- *Tissue specific response to nanoparticles*
- *Recognition and clearance of nanoparticles*
- *Round Table Discussion on Experimental nanotoxicology as the basis for intelligent risk assessment; What critical information is lacking to develop adequate risk assessment models?*

Recent Published Literature Findings

Damming the flow of drugs into drinking water.
(Hemminger P., Environ Health Perspect. 2005 Oct;113(10):678-81)

Over the past several years, some 100 pharmaceuticals have been found in waterways in Europe and the United States, in concentrations of parts per billion to parts per trillion, raising the question of what effects such pollution may be having on ecosystems and human health. The European Medicines Agency has proposed an environmental risk assessment procedure that will take into account the possibility of environmental effects from these pharmaceuticals and their by-products, with a strong focus on extremely low concentrations of bioactive substances such as endocrine disruptors.

A safety assessment of coumarin taking into account species-specificity of toxicokinetics.
(Felter SP, Vassallo JD, Carlton BD, Daston GP., Food Chem Toxicol. 2005 Sep 30; in press)

Exposure of coumarin (1,2-benzopyrone), found in a variety of plants and spices, is mainly through the diet and from its use as a perfume raw material in personal care products. High doses of coumarin by the oral route are known to be associated with liver tumours in rats and mice, and lung tumours in mice. A quantitative human health risk assessment that integrates both cancer and non-cancer effects is presented in this paper.



Risk assessment of adenoviruses detected in treated drinking water and recreational water.
(Heerden J, Ehlers MM, Vivier JC, Grabow WO., J Appl Microbiol. 2005;99(4):926-33)

Human adenoviruses (HAd) have previously been detected in sewage and polluted river and dam water, as well as treated drinking water, causing a wide range of infections associated with the gastrointestinal, respiratory and urinary tracts, and the eyes. In this study, it was reported that the risk of infection exceeded the tolerable risk of one infection per 10 000 consumers per year proposed for drinking water. However, the results for river and dam water used for recreational purposes were within the tolerable risk of one infection per 1000 bathers per day. This article compares the risk of HAd infection in drinking water and recreational water with the actual risk of infection.

Influence of Tap Water Quality and Household Water Use Activities on Indoor Air and Internal Dose Levels of Trihalomethanes.
(Nuckols, John R., Ashley, David L., Lyu, et al., Environmental Health Perspectives; Jul 2005, Vol. 113 Issue 7, p863)

Individual exposure to trihalomethanes (THMs) in tap water can occur through ingestion, inhalation, or dermal exposure, with studies indicating that inhaled or dermal exposure routes result in a greater increase in blood THM concentration than does ingestion. In this study, blood and exhaled air concentrations of THM were measured in participants conducting 14 common household water use activities, and reference samples for water supply and air (pre-water use activity), as well as tap water and ambient air samples were collected. All hot water use activities yielded a 2-fold increase in blood or breath THM concentrations for at least one individual. The results clearly indicate that epidemiology studies concerning THMs need to consider hot water use activities as important exposure events.

Toxicological Guidelines for Monocyclic Nitro-, Amino- and Aminonitroaromatics, Nitramines, and Nitrate Esters in Drinking Water
(K.- M. Wollin and H. H. Dieter., Archives of Environmental Contamination and Toxicology; Volume 49, Number 1., Pages: 18 – 26 published Online 4 April 2005)



The setting of tolerable/acceptable ceilings of drinking water hygiene is required with regard to xenobiotics resulting from several anthropogenic impacts. NCs serve as intermediates for dyes, pharmaceuticals, and synthetic materials, and are used as solvents, explosives, and pesticides. This article discussed the toxicological evaluation and derivation of guideline values for NCs, and reviewed the suitable estimates of excess lifetime cancer risk.

Potential Role of Ultrafine Particles in Associations between Airborne Particle Mass and Cardiovascular Health.

(Delfino, Ralph J. Sioutas, Constantinos, Malik, Shaista., *Environmental Health Perspectives*; Aug 2005, Vol. 113 Issue 8, p934, 13p)

Coronary heart disease is the cause of death and hospitalisation among adults 65 or more years. Cardiovascular hospital admissions and mortality have been linked to outdoor air pollution, particularly mass concentrations of particulate matter (PM) ≤ 2.5 or ≤ 10 mm in diameter (PM_{2.5}, PM₁₀), showing associations



between PM and risk of cardiac ischemia and arrhythmias, increased blood pressure, decreased heart rate variability, and increased circulating markers of inflammation and thrombosis. Ultrafine particles < 0.1 μm (UFPs) from products of fossil fuel combustion dominate particle number concentrations and surface area, and are therefore capable of carrying large concentrations of adsorbed or condensed toxic air pollutants. High UFP exposures may therefore induce inflammation, and promote the progression of atherosclerosis and precipitate acute cardiovascular responses.

Amended final report on the safety assessment of polyacrylamide and acrylamide residues in cosmetics.

[No authors listed] (*Int J Toxicol.* 2005;24 Suppl 2:21-50)

Polyacrylamide is a polymer formed by the polymerization of acrylamide monomers. An Australian risk assessment suggested negligible health risks from acrylamide in cosmetics. However, the Cosmetic Ingredient Review (CIR) Expert Panel acknowledged that acrylamide is a neurotoxin in humans and a carcinogen in animal tests. Based on the genotoxicity and carcinogenicity data, the Panel does not believe that acrylamide is a genotoxic carcinogen and that several of the risk assessment approaches have overestimated the human cancer risk. However, the Panel did conclude that it was appropriate to limit acrylamide levels to 5 ppm in cosmetic formulations.

Fundamental flaws of hormesis for public health decisions.

(Thayer KA, Melnick R, Burns K, Davis D, Huff J., *Environ Health Perspect.* 2005 Oct;113(10):1271-6)

Hormesis, defined as low-dose stimulation, high-dose inhibition, is a novel theory which states that while high-level exposures to toxic chemicals could be detrimental to human health, low-level exposures would be beneficial. In this article, the hormesis hypothesis was evaluated and its potential adverse consequences of incorporating low-dose beneficial effects into public health decisions and risk assessment discussed.

3-Nitrobenzanthrone, a potential human cancer hazard in diesel exhaust and urban air pollution: a review of the evidence.

(Arlt VM., *Mutagenesis.* 2005 Sep 30; in press)

Epidemiological studies have shown that an increased risk of lung cancer is linked to exposure to diesel exhaust and urban air pollution. 3-Nitrobenzanthrone [3-nitro-7H-benz[de]anthracen-7-one (3-NBA)] is an extremely potent mutagen and suspected human carcinogen identified in diesel exhaust and ambient air particulate matter, and its main metabolite, 3-aminobenzanthrone (3-ABA), was found in the urine of salt mine workers occupationally exposed to diesel emissions. This article provides a critical review on the potential genotoxic effects of 3-NBA on human health, given its wide exposure in the environment.

Research Strategies for Safety Evaluation of Nanomaterials, Part IV: Risk Assessment of Nanoparticles (Symposium Summary).

(Tsuji JS, Maynard AD, Howard PC, James JT, Lam CW, Warheit DB, Santamaria AB., Toxicol Sci. 2005 Sep 21; in press)

This symposium summarizes recent findings in exposure and toxicity of nanoparticles (small-scale substances of <100 nm) and their application for assessing human health risks. For example, carbon nanotubes apparently have greater pulmonary toxicity (inflammation, granuloma) in mice than fine-scale carbon graphite and their metal content may affect toxicity, and studies on TiO₂ and quartz illustrate the complex relationship between toxicity and particle characteristics. These recent toxicity and exposure data will impact on human health risk assessments that will be used to regulate the use of nanomaterials in consumer products.

Nanoscale Technologies for Assessing Risk and Improving Public Health.

(Balshaw DM, Philbert M, Suk WA., Toxicol Sci. 2005 Sep 14; in press)

This article discusses recent technological innovations capitalizing on the emergent properties of nanoscale materials and their potential adaptation to improving individual exposure assessment, determination of biological response and environmental remediation, and to raise the environmental health science community's awareness and encourage the development of improved strategies for assessing risks.