

# IPCS News

The Newsletter of the International Programme on Chemical Safety

Issue 13



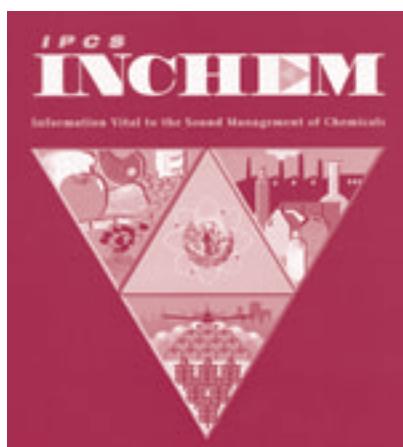
March 2002

## INCHEM database now free!

Previously available only by subscription, the vast chemical safety database INCHEM is now accessible free of charge by all.

For more than two decades the IPCS has been producing international evaluations of chemicals, as well as a range of other documents on chemical safety. Until 1996 these evaluations were available only in printed form. This wealth of knowledge, plus that from other international bodies, has since 1996 gradually been accumulated in a single electronic database known as INCHEM. This was initially issued in CD-ROM form and in 1998 became available, still on a subscription basis, via the Web.

On 1 June 2001 the INCHEM service became available free of charge to people around the world via the Internet. "IPCS aims to disseminate its chemical risk assessment and chemical risk management products as widely as possible, in support of the long-range objectives of the United Nations Conference on Environment and Development. Provision of the IPCS INCHEM database on the web free of charge to the end user is a very important step in that direction," said Dr Tim Meredith, IPCS Coordinator.



Offering this service without charge allows individuals, especially those from developing countries or those working in organizations with limited resources, and even the general public, access to a vast amount of chemical safety information.

INCHEM responds directly to one of the Intergovernmental Forum on Chemical Safety (IFCS) priority actions to consolidate cur-

rent, internationally peer-reviewed, chemical safety-related publications and database records from international bodies, for public access. It is produced through cooperation between the IPCS and the Canadian Centre for Occupational Health and Safety (CCOHS).

CCOHS is Canada's national agency dedicated to eradicating workplace illness and injuries and creating a safe and healthy working environment for everyone. "This endeavour will ensure the continued quality, integrity, upgrading and further expansion of the programme for all people throughout the world," stated Len Hong, CCOHS's President and Chief Executive Officer. "It is our ongoing vision to make global chemical safety a reality," he added.

INCHEM includes a powerful text-and-index-searching capability. Words or phrases are used to initiate a search within a current document or

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Chemical incidents can happen anywhere and at any time. Although they are usually accidental (e.g. a tanker spill or an explosion in a chemical factory), they may sometimes be caused deliberately. The IPCS has an important role in coordinating the response to such incidents and has put in place a number of relevant activities.

A worldwide 24-hour International Enquiry Response Service dealing with health aspects of chemical incidents is being established. A surveillance system is being developed by this Service, utilizing the Chemicals Incident Reporting Programme software developed by the IPCS. This enables harmonized data collection concerning the health

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IOMC

INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS

# Trace elements: essentiality and toxicity

Protecting humans from the adverse effects of excessively low or high intakes of essential trace elements requires new approaches in risk assessment.

To maintain good health, humans require an adequate daily intake of nutrients, including the following essential trace elements (ETEs): chromium, cobalt, copper, iodine, iron, manganese, molybdenum, selenium and zinc. Based on their essentiality in non-human biological systems, boron, nickel, silicon and vanadium are probably also essential for humans, but additional research is required to confirm their role in human health.

ETEs are important in all stages of human development. They are required for the activity of hundreds of enzymes required for the maintenance of life from conception to death. In fact, they are also essential for the development of the genetic material in sperm and eggs. However, as with any chemical, high intakes of ETEs may result in toxicity. These two factors (essentiality and toxicity) must be balanced in order to fully protect humans from exposure to ETEs. Unlike non-essential trace elements, adverse human health effects can occur from inadequate intake (deficiency) of ETEs, as well as at excessively

high intakes (toxicity). Therefore, it cannot be assumed that there is no risk from ETEs at zero exposure, as is the case in assessing the risks from non-essential chemicals. The challenge for scientists is the determination of the boundaries of what can be called an acceptable range of oral intakes (AROI) from the typical U-shaped dose-response curve for ETEs shown in the graph.

In the theoretical biphasic dose-response curve (actual curves for specific ETEs may not be symmetrical) typical for ETEs, there is a range of intakes where the body, through homeostatic mechanisms, maintains the concentration of ETEs in the body at an adequate level. All ETEs have specific homeostatic mechanisms, which must be considered in the risk assessment process.

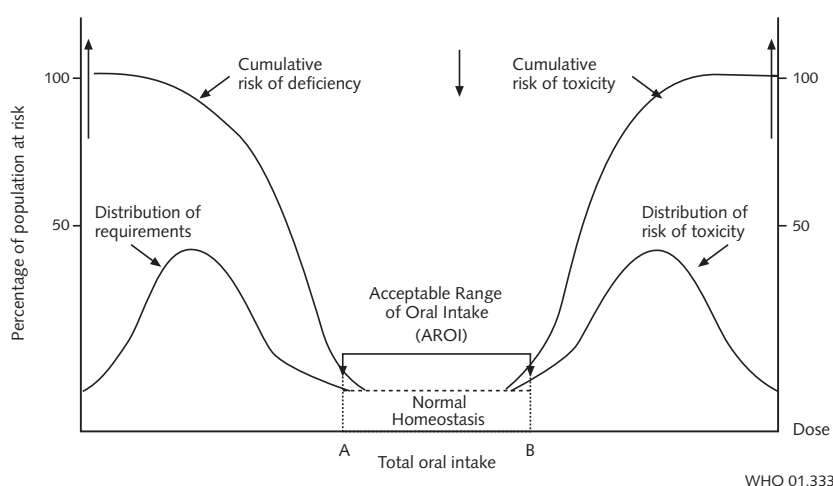
Adverse effects are observed when ETE intake is very low (deficiency) or excessive (toxicity) and the homeostatic mechanisms are unable to maintain the concentration of ETE in the body within the normal range. As shown, the two arms of this dose (intake)-response curve

represent an increased probability of adverse effects as the intake falls below boundary A and an increased probability of toxicity in the population as the intake increases beyond boundary B.

In the past, exposure guidelines to protect humans from toxic effects of chemicals, including essential elements (Tolerable Daily Intake (TDI) or the upper boundary of the AROI), have been developed separately from recommended nutritionally adequate intakes that avoid adverse effects from deficiency (Recommended Daily Allowance (RDA) or the lower boundary of the AROI). In some instances this has led to conflicting recommendations. Exposure guidelines to protect for toxicity (TDI or Reference Dose) have been developed that are equal to, or less than, the nutritional requirements of some age-specific population groups (e.g., in the case of zinc).

In other cases, the range between the dietary recommendation and the TDI is very narrow, resulting in a TDI that is well within the daily intakes of healthy populations (e.g., selenium). Such conflicts point toward the need for new principles and methods for the assessment of risks from ETEs, where nutritional and toxicological information is evaluated in a balanced process that takes into account all the data available on the ETE of concern. To address this issue in risk assessment, the IPCS, building upon earlier initiatives in North America and Europe, drafted Environmental Health Criteria (EHC) outlining the scientific principles that would be required to support any new risk assessment methodology for ETEs. With the generous support of the South Australia Health Commission, USEPA Office of Water, and the Ministry of Health, Government of Chile, the

Figure 1 Percentage of population at risk of deficiency and toxicity effects according to oral intake



IPCS convened a Working Group in April 1998 and a Task Group in February 2001, both hosted by the Government of Chile.

The Task Group, composed of 12 experts from 9 countries, reviewed the literature on the development of dietary guidelines, toxicity risk assessment and the factors affecting the biological activity and homeostasis of ETEs in humans, and developed the set of scientific principles summarized here. They also proposed a methodology which they called the homeostatic model, based on these principles, for the determination of the AROI for ETEs.

To provide support for these principles, the EHC, which will be published in early 2002 as monograph 228 in the Environmental Health Criteria series, presents an overview of the scientific literature on many important areas. These include methodology for development of exposure guidelines, bioavailability, homeostasis and factors affecting homeostatic mechanisms, nutrient/nutrient and nutrient/dietary interactions, variation in human response and the range of clinical and biochemical markers of deficient and toxic exposures.

In general, the principles elaborated in EHC 228 are applicable, and the methodology useful (with perhaps minor revision), to all essential human dietary components under homeostatic control. In addition, the principles are generally applicable for the ecological risk assessment of ETEs.

The methodology presented in EHC 228 is not intended to replace the risk assessment model of hazard identification, dose-response evalu-

ation, exposure assessment and risk characterization used internationally for the assessment of risks from exposure to chemicals, and which is discussed in detail in EHC 210 *Principles for the assessment of risks to human health from exposure to chemicals*. In fact, the development of the boundaries of the AROI utilizes the same four steps.

The new model put forward by the Task Group requires that the principles proposed for the assessment of risk from ETEs be applied at each step. Whether a benchmark approach or the traditional NOAEL ÷ Uncertainty Factor is used in developing the upper boundary of the AROI, the scientist must apply the principles shown here to the assessment of ETEs. There is the same requirement for the scientists developing the lower (nutritional) boundary of the AROI.

Toxicologists and nutritionists should not develop the boundaries of the AROI independently. They must be developed by scientists from a range of disciplines within the fields of nutrition, toxicology and medicine, working together in a collaborative and iterative process. The IPCS hopes to encourage all countries to adopt this approach in order to ensure adequate public health protection from exposure to ETEs.

During the development of EHC 228, similar but independent activities were initiated within the European Commission and the US National Academy of Sciences, Food and Nutrition Board. The principles and methods developed by both organizations are similar to those proposed by the IPCS. The efforts of the IPCS to ensure that the methods used

## Scientific principles crucial for assessing human health risks from exposure to any ETE

- For all ETEs, there is a "zone of safe and adequate exposure for each defined age and gender group" which is compatible with good health. This is the AROI.
- Homeostatic mechanisms should be identified for the selected ETE and variations in homeostatic mechanisms within populations considered.
- All appropriate scientific disciplines must be involved in developing an AROI.
- Data on toxicity and deficiency should receive equal critical evaluation.
- Bioavailability should be considered in assessing the effects of deficiency and toxicity.
- Nutrient interactions should be considered when known.
- Chemical species and the route and duration of exposure should be fully described.
- Biological end-points used to define the boundaries of the AROI should ideally have similar degrees of functional significance.
- All appropriate data should be used to determine the dose-response curve for establishing the boundaries of the AROI.

*Adapted from EHC 228: Principles and methods for the assessment of risks from essential trace elements. WHO, Geneva.*

within the various organizations are truly harmonized will be beneficial to all countries. ♦

## Chemical incidents

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impact of chemical incidents on population groups.

Some 60 IPCS Chemical Emergency Response Cards are in the process of being prepared for first responders, based on the IPCS International Chemical Safety Cards.

Another important source of information in responding to emergencies is the IPCS INCHEM database (see above), which includes IPCS Guidance on Public Health Roles and Chemical Incidents. This describes how countries can improve the public health response to acute chemical incidents.

Advice is currently being prepared for the protection of UN staff working in areas where chemical weapons may be used.

*Additional information on this project can be obtained via the IPCS webpage ([www.who.int/pcs/chem\\_incid\\_main.html](http://www.who.int/pcs/chem_incid_main.html)) or from Dr Kersten Gutschmidt, IPCS (e-mail: [gutschmidt@who.int](mailto:gutschmidt@who.int)).*

# Fluoride: both beneficial and harmful

In common with essential elements, fluoride has both positive and negative effects on human health.

● It was Paracelsus who wrote in the 16<sup>th</sup> century that “All things are poison ... Solely the dose determines that a thing is not a poison”. He might have been thinking of fluoride, which, like many other chemicals, is distinctly harmful at high concentrations yet has beneficial properties at lower ones.

Fluorides are released into the environment naturally from processes such as weathering of minerals and emission from volcanoes. Particularly high levels are found in surface water where there is geothermal activity, e.g. up to 50 mg/litre in hot springs and as much as 2800 mg/litre in certain of the Rift Valley lakes of East Africa. Adding to the natural concentrations are inputs from human activities such as coal combustion, the production of metals, phosphate ore, fertilizers and adhesives, and the manufacture of glass, bricks and ceramics.

Many industrial processes use fluoride. Hydrogen fluoride, whose annual world consumption exceeds 1 million tonnes, is used to produce cryolite, motor gasoline alkylates and chlorofluorocarbons, and to etch glass; calcium fluoride is used as a flux in steel, glass and enamel production and an electrolyte in aluminium production; and sodium

fluoride is used as a preservative in glues, an insecticide and a wood preservative.

In the non-industrial context, fluoride is best known for its use in the controlled fluoridation of drinking-water and as a caries-preventing agent in toothpaste. In view of the beneficial effects of fluoride in reducing dental decay, WHO recommended in 1984 and again in 1996 a guideline value in drinking-water of 1.5 mg fluoride/litre. However, it stressed that this was not a “fixed” value but was intended to be implemented in the light of local conditions (e.g. diet, water consumption).

In May 2001 the IPCS convened in Beijing, China, a Task Group composed of 18 experts from 13 countries to evaluate the human health and environmental risks from exposure to fluorides. The meeting was achieved through the generous support of the Office of Water, US Environmental Protection Agency, and with the invaluable assistance of the Institute of Environmental Health and Engineering, Chinese Academy of Preventive Medicine. This article summarizes the main conclusions, which will be published in 2002 as a monograph in the Environmental Health Criteria series.

## How does fluoride reduce dental decay?

The fact that fluoride reduces dental caries has been known for many decades and has led to measures such as controlled fluoridation of drinking-water, introduction of fluoridated toothpaste, mouthrinses, gels and varnishes, and experimentation with fluoride supplements, fluoridated salt and fluoridated milk. But how does fluoride act? Historically, it was believed that fluoride had to become incorporated into the crystal lattice of enamel in order to effectively prevent the development of dental caries. Fluoride was considered to improve lattice stability and render the enamel less soluble to acid demineralization. There is now, however, an increasing body of evidence to suggest that the activity of fluoride is mainly due to its effects on erupted teeth, and that the continual presence of fluoride in the saliva and in the fluid phase of dental plaque is critical to its mechanism of action. There is growing belief that through its interaction with the surface of enamel, fluoride in saliva and dental plaque inhibits the demineralization and promotes the remineralization taking place at the surface of the tooth.

## What is skeletal fluorosis?

Skeletal fluorosis manifests itself as pain and stiffness of the joints, and is associated with osteosclerosis, calcification of ligaments and tendons, bone deformities, muscle wasting and neurological deficits. Fluoride becomes incorporated into the crystal lattice of bone by replacing some of the hydroxyl ions with the unit cells of hydroxyapatite, producing partially fluoridated hydroxyapatite. Although this incorporation may increase the stability of the crystal lattice and render bone less soluble, bone mineralization is delayed or inhibited. Consequently, the bones may become brittle and their tensile strength may be reduced.

## Exposure pathways

Humans may be exposed to fluoride from air, soil, food and water, and in the workplace. Airborne fluoride exists in gaseous and particulate forms derived from both natural and anthropogenic sources. Concentrations are generally less than 0.1 µg/m<sup>3</sup> but in areas of China where fluoride-rich coal is used as a source of fuel, indoor air levels as high as 155 µg/m<sup>3</sup> have been reported.

For adults the consumption of food and drinking-water is the principal route of fluoride intake, which generally totals less than 4 mg/day. Tea and fish are particularly rich in fluoride. In areas of the world where environmental levels are high (e.g., parts of China, India and East Africa) or diets are rich in fluoride, intake may be as high as 27 mg/day. Occupational exposure to fluoride can occur in workers involved in welding or in the processing of aluminium, iron or phosphate ores.

## Health effects

In common with essential elements, fluoride has both positive

and negative effects on human health. Compared to other chemicals, however, the range of concentrations concerning normal exposure, intake leading to beneficial effects, and exposure causing adverse effects is quite narrow. A fluoride level in drinking-water of around 1 mg/litre has long been known to cause a reduction of dental caries and the use of fluoride to treat osteoporosis has been investigated.

Fluoride accumulates almost exclusively in bones and teeth, which explains why these are affected at lower concentrations than other tissues or organs. Dental fluorosis involves brown stains on the tooth surface and, in severe cases, pitting or corrosion of the teeth.

Prolonged exposure (e.g., for 10–20 years) to high levels of fluoride (in excess of 10 mg/day) may lead to crippling skeletal fluorosis. This is normally due to consumption of fluoride-rich drinking-water, but several factors, such as nutritional status, diet, climate (which affects fluid intake) and concomitant exposure to other substances, influence the development of this disease. Many millions of people around the world are affected by skeletal fluorosis: in China and India alone these are, respectively, 1.7 million and 1 million sufferers.

### Effects of fluoride on wildlife and domestic animals

Natural fluoride levels in the freshwater environment are usually lower than those reported to have effects on aquatic organisms in laboratory and field experiments, but effects might be seen in the vicinity of industrial discharges. Organisms living in soft water environments are at considerably greater risk than those in hardwater areas. Certain freshwater clams are particularly sensitive, and a change in the migratory behaviour of Chinook salmon has been observed at fluoride levels as low as 0.5 mg/litre. Fluoride is generally strongly adsorbed by soils and so plant uptake from soil is relatively low. Thus, plant toxicity from uptake of fluoride from soil is rare.

Concentrations of fluoride in vegetation in the vicinity of fluoride emission, such as aluminium smelters, can be higher than the lowest dietary effect concentration reported for mammals in laboratory experiments. Fluorosis in domesticated animals has been reported. There is a potential risk from fluoride-contaminated pasture and soil ingestion due to the long-term use of phosphatic fertilizers containing fluoride as an impurity. Fluoride-induced effects, such as lameness and tooth damage, have also been reported in deer and in small mammals close to anthropogenic sources of fluoride.

Some studies have shown increased rates of hip fracture in elderly people associated either with intake of fluoride-rich drinking-water or treatment of osteoporosis with sodium fluoride.

Numerous studies have examined the relationship between human fluoride intake and morbidity or mortality due to cancer (e.g. bone, lung), but there has been no consistent evidence of any such association. The same applies in the case of a possible increased risk of spontaneous abortion or congenital malformation.

### Recommendations

The Task Group recommended that consideration be given to the levels of fluoride and the means of application required to maximize the beneficial effects while minimizing the potential for adverse effects on the skeleton. It also recommended a more detailed identification of areas where significant fluorosis occurs, as well as more research to characterize total fluoride exposure, exposure–response relationships and the various factors that influence these.

One further recommendation was that, in areas where there is increased fluoride due to anthropogenic activity, environmental levels should be monitored using appropriate bioindicators. ♦

## INCHEM database free!

(Continued from page 1)

within all documents in the database. The document collection currently includes:

- Environmental Health Criteria monographs
- Concise International Chemical Assessment Document (CICADS)
- Health and Safety Guides
- International Chemical Safety Cards

- IPCS/EC Evaluation of Antidotes Series
- Joint Expert Committee on Food Additives (JECFA) monographs and evaluations, Joint Meeting on Pesticide Residues (JMPR) monographs and evaluations
- Pesticide Data Sheets
- Poisons Information Monographs
- Screening Information Data Set (SIDS) for High Production Volume Chemicals

- International Labour Organization (ILO/CIS) Chemical Information
- International Agency for Research on Cancer (IARC) Summaries and Evaluations

More chemical safety information from international bodies will be added progressively to the collection. ♦

The INCHEM Internet address is <http://www.inchem.org>

# Integrated risk assessment

**Integrated risk assessment is a science-based approach that combines the processes of risk estimation for humans, biota and natural resources in one assessment.**

For practical and historical reasons, human health and environmental risk assessment methodologies have generally developed independently. However, with increased recognition of the need to more effectively protect both humans and the environment, an integrated, holistic approach to risk assessment that addresses real life situations of multichemical, multimedia, multiroute and multispecies exposures is needed.

The IPCS, in collaboration with the European Commission, the US Environmental Protection Agency (US EPA) and other international and national organizations, has developed a collaborative partnership to foster the integration of assessment

approaches to evaluate human health and ecological risks. The overall objectives of this effort are to promote international understanding and acceptance of the integrated risk assessment process. A generic framework and four case studies for conducting integrated risk assessment have been developed. The framework and case studies were evaluated in April 2001 at a scientific workshop held in Ispra, Italy. This workshop was attended by over 40 participants, representing diverse international and national organizations. It identified: 1) the benefits of and obstacles to integrated risk assessment; 2) research needed to facilitate the implementation of integrated risk assessment; and 3) mechanisms and actions that can be

taken to facilitate the practical application of integrated risk assessment by regulatory bodies. The framework, case studies and workshop report are currently being prepared for publication in the peer-reviewed scientific literature.

The specific issues involved in integrated risk assessment must be defined at the problem formulation stage and will vary from case to case. It is hoped that through this collaborative effort, risk assessments globally will be based on a more holistic knowledge of the effects of chemicals on the environment and human health. ♦

*Additional information on this project can be obtained from Dr Terri Damstra, IPCS (e-mail: damstra@niehs.nih.gov).*

## IPCS welcomes Sam Page

Dr. Sam Page has joined IPCS for a two-year secondment from the U.S. Food and Drug Administration in Washington, DC. He joins Dr. John Herrman in the project to update, consolidate and harmonize the general principles for the risk assessment of food additives, contaminants, residues of pesticides and veterinary drugs, and food components.

Dr Page joined the U.S. Food and Drug Administration in 1974. He has held a number of research and research management positions in the areas of the chemistry and toxicology of chemical contaminants, natural toxins, and dietary supplements.

He has also been a active participant in a number of scientific professional societies, including election as a Fellow and to the Board of Directors of AOAC International, the Council of Experts of the United States Pharmacopeia, and as Secretary to the Commission on Food Chemistry of the International Union of Pure and Applied Chemistry.

Among the most satisfying aspects of his career have been his efforts in



*(pictured here are Sarah, Caitlin, Samantha, and Jake, in chronological order).*

mentoring women and disadvantaged students, most of whom have gone on to obtain advanced degrees. His other teaching experience has included development and teaching of honours courses at the University of Maryland.

Dr Page was appointed in 1996 as Scientific Director of the Joint Institute for Food Safety and Applied Nutrition (JIFSAN), which is a co-operative programme between the University of Maryland and the Food and Drug

Administration. It serves as the foundation for the development of public and private partnerships to carry out research and education programmes in food safety and applied nutrition. He was instrumental in establishing food safety risk analysis as the central theme of JIFSAN. The decision to leave this effort in its developmental phases was particularly difficult, but the attraction of making an impact on risk assessment and public health at the international level and living in Geneva was more than he could turn down.

Among his other objectives while at WHO are to foster international collaborative research in risk assessment and to develop training programs providing improved opportunities for underrepresented groups to participate in risk assessment activities.

Sam and his fiancée Jane Hohn look forward to enjoying their work in Geneva, learning French, and hiking and biking throughout Europe. They will, of course, miss their grandchildren! ♦

## Recent publications

### *Environmental Health Criteria*

- 214 Human exposure assessment
- 216 Disinfectants and disinfectant by-products
- 218 Flame retardants: tris(2-butoxyethyl) phosphate, tris(2-ethylhexyl) phosphate and tetrakis(hydroxymethyl) phosphonium salts
- 219 Fumonisin B1
- 220 Dinitro-ortho-cresol
- 223 Neurotoxicity risk assessment for human health: principles and approaches
- 224 Arsenic and arsenic compounds (2nd edition)
- 225 Principles for evaluating health risks to reproduction associated with exposure to chemicals

### *Concise International Chemical Assessment Documents*

- 16 Azodicarbonamide
- 18 Cumene
- 19 Phenylhydrazine
- 20 Mono-nitrophenols
- 21 2-Furaldehyde
- 22 Ethylene glycol – environmental aspects
- 23 2,2-Dichloro-1,1,1-trifluoroethane (HCFC-123)
- 24 Crystalline silica, quartz
- 25 Chloral hydrate
- 26 Benzoic acid and sodium benzoate
- 27 Diphenylmethane diisocyanate (MDI)
- 28 Methyl chloride
- 29 Vanadium pentoxide and other vanadium compounds
- 30 1,3-Butadiene
- 31 N,N-Dimethylformamide

### *Joint FAO/WHO Expert Committee on Food Additives (JECFA)*

*Evaluation of certain veterinary drug residues in food* (fifty-second report of the Joint FAO/WHO Expert Committee on Food Additives). WHO Technical Report Series, No. 893, 2000.

*Evaluation of certain food additives and contaminants* (fifty-third report of the Joint FAO/WHO Expert

Committee on Food Additives). WHO Technical Report Series, No. 896, 2000.

*Evaluation of certain veterinary drug residues in food* (fifty-fourth report of the Joint FAO/WHO Expert Committee on Food Additives). WHO Technical Report Series, No. 900, 2001.

*Evaluation of certain food additives and contaminants* (fifty-fifth report of the Joint FAO/WHO Expert Committee on Food Additives). WHO Technical Report Series, No. 901, 2001.

*Safety evaluation of certain food additives and contaminants*. WHO Food Additives Series, No. 44, 2000.

*Toxicological evaluation of certain veterinary drug residues in food*. WHO Food Additives Series, No. 45, 2000.

*Safety evaluation of certain food additives and contaminants*. WHO Food Additives Series, No. 46, 2001.

### *Joint FAO/WHO Meeting on Pesticide Residues (JMPR)*

*Pesticide residues in food – 1999*. Report of the Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Core Assessment Group. FOA Plant Production and Protection Paper, 153, 1999.

*Pesticide residues in food – 2000*. Report of the Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Core Assessment Group. FOA Plant Production and Protection Paper, 163, 2001.

*Pesticide residues in food – 2000 evaluations*. Part II – Toxicological. World Health Organization, WHO/PCS/01.3, 2001.

*Pesticide residues in food – 1999 evaluations*. Part II – Toxicological. World Health Organization, WHO/PCS/00.4, 2000.

*Inventory of IPCS and other WHO pesticide evaluations and summary of toxicological evaluations*

Unless stated otherwise, these publications are obtainable from the Office of Distribution and Sales, World Health Organization, 1211 Geneva 27, Switzerland

*performed by the Joint Meeting on Pesticide Residues through 2000* (WHO/PCS/01.1). Obtainable free of charge from IPCS; also available via the IPCS web site ([www.who.int/pcs](http://www.who.int/pcs)).

### *Other publications*

IPCS guidelines for the monitoring of genotoxic effects of carcinogens in humans – Special issue of Reviews in Mutation Research, August 2000, Vol. 463, No. 2

(full text available free at [www.mutationresearch.com](http://www.mutationresearch.com)).

Guidance document on the use of data in development of chemical-specific adjustment factors (CSAFs) for interspecies differences and human variability in dose/concentration-response assessment. World Health Organization (WHO/PCS/01.4). Obtainable free of charge from IPCS.

The WHO recommended classification of pesticides by hazard and guidelines to classification 2000-2001. World Health Organization (WHO/PCS/01.5).

Obtainable free of charge from IPCS.



## Maged Younes

Having spent 6 years with IPCS, where he was responsible for overall coordination and management of its work in the fields of risk assessment and methodologies, Dr Maged Younes has now moved to fresh pastures. In July 2001, Dr Younes took up the duties of Senior Scientist, Office of the Director, Department of Protection of the Human Environment at WHO. Besides assisting the Director with overall management and coordination, he is leading a small team charged with coordinating cross-cutting environmental health issues such as risk assessment, environmental burden of disease, environmental health impact assessment and global change. Consequently he still retains close links with the ongoing work of IPCS.

# International Chemical Safety Cards

The International Chemical Safety Card (ICSC) project was initiated in 1987 and the first cards were produced in October 1987 in Berlin. Since then the project has been carried out through cooperation between the IPCS, ILO and European

Union. It is also a contribution to the implementation of recommendations made by the 1992 UN Conference on Environment and Development (UNCED) in its Agenda 21, Chapter 19 on environmentally sound management of toxic chemicals. The ICSC project relates directly to two programme areas for action identified in Chapter 19, namely the global harmonization system of classification and labelling of chemicals and information exchange on toxic chemicals and chemical risks.

ICSCs summarize essential health and safety information on pure chemical substances in a clear way. They are intended for use at the shop-floor level by workers, and by those responsible for safety and health in factories, agriculture, construction and other workplaces. They are also designed for use by employers to provide information and instruction to their workers.

The ICSC project has two main activities: preparation of cards and their translation into various languages.

ICSCs are prepared through an ongoing process of drafting and peer-review by scientists from specialized institutions designated by those countries that contribute to the work of the IPCS. This process also takes account of the advice and comments

provided by manufacturers', workers' and employers' organizations and by institutions specialized in chemical safety, toxicology and medicine. To date 1400 cards have been assessed and, of these, about 1300 have been accepted.

Translation of ICSCs is being undertaken into 26 languages, most recently into Estonian, Hebrew, Portuguese and Vietnamese.

The preparation and translation process is based on a specialized computer programme that includes a library of standard phrases, data entry modules, an online guide to the selection and use context for each of the standard phrases, and a module for automatic translation from English into any language for which standard phrases are available in the system.

Finalized cards are available free of charge in Chinese, English, Finnish, French, German, Hungarian, Japanese, Korean, Russian, Spanish, Swahili, Thai and Urdu on the Internet, and can be accessed via the IPCS website ([www.who.int/pcs](http://www.who.int/pcs)). In addition, ICSCs are disseminated through a number of CD-ROM publications produced by the IPCS and ILO. ♦

*More information on the ICSC project can be obtained from Ms S. Takala, IPCS ([takalas@who.int](mailto:takalas@who.int)).*

## Forthcoming publications

### *Environmental Health Criteria*

- 221 Zinc
- 222 Biomarkers in risk assessment: validity and validation
- 226 Palladium
- 227 Fluorides
- 228 Principles and methods for the assessment of risk from essential trace elements

### *Concise International Chemical Assessment Documents*

- 32 Beryllium and beryllium compounds
- 33 Barium and barium compounds
- 34 Chlorinated naphthalenes
- 35 N-methyl-2-pyrrolidone
- 36 Methyl cyanoacrylate and ethyl cyanoacrylate
- 37 Chlorine dioxide
- 38 N-Nitrosodimethylamine
- 39 Acrylonitrile

## How to receive IPCS publications rapidly

The fastest way to obtain an IPCS product that has been published by the World Health Organization is as follows. Send details of the publication that you require (be sure to give the exact title) to the WHO Distribution and Sales Office (Fax no: +41 22 791 4857 or E-mail: [publications@who.int](mailto:publications@who.int)). Supply details of your credit card, including the card number, expiry date and the card holder's name. Specify if you come from a developing country since this will permit a 30% reduction in cost.

Issued by the International Programme on Chemical Safety, World Health Organization, 1211 Geneva 27, Switzerland  
Telephone: +41 22 791 3590    Telefax: +41 22 791 4848  
E-mail: [ipcsmail@who.int](mailto:ipcsmail@who.int)    Website: [www.who.int/pcs](http://www.who.int/pcs)

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Design and production: Marilyn Langfeld

ISSN 1019-0150