IPCS

INTERNATIONAL PROGRAMME ON CHEMICAL SAFETY

WHO ILO UNEP

Environmental Health Criteria 240

Principles and Methods for the Risk Assessment of Chemicals in Food

Front Matters
Preamble, Preface, Table of Content

A joint publication of the Food and Agriculture Organization of the United Nations and the World Health Organization

Food and Agriculture Organization of the United Nations

World Health Organization

Environmental Health Criteria 240

PRINCIPLES AND METHODS FOR THE RISK ASSESSMENT OF CHEMICALS IN FOOD

A joint publication of the Food and Agriculture Organization of the United Nations and the World Health Organization

Published under the joint sponsorship of the United Nations Environment Programme, the International Labour Organization and the World Health Organization, and produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals.

Food and Agriculture Organization of the United Nations

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The **International Programme on Chemical Safety (IPCS)**, established in 1980, is a joint venture of the United Nations Environment Programme (UNEP), the International Labour Organization (ILO) and the World Health Organization (WHO). The overall objectives of the IPCS are to establish the scientific basis for assessment of the risk to human health and the environment from exposure to chemicals, through international peer review processes, as a prerequisite for the promotion of chemical safety, and to provide technical assistance in strengthening national capacities for the sound management of chemicals.

The **Inter-Organization Programme for the Sound Management of Chemicals (IOMC)** was established in 1995 by UNEP, ILO, the Food and Agriculture Organization of the United Nations, WHO, the United Nations Industrial Development Organization, the United Nations Institute for Training and Research and the Organisation for Economic Co-operation and Development (Participating Organizations), following recommendations made by the 1992 UN Conference on Environment and Development to strengthen cooperation and increase coordination in the field of chemical safety. The purpose of the IOMC is to promote coordination of the policies and activities pursued by the Participating Organizations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

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ENVIRONMENTAL HEALTH CRITERIA ON PRINCIPLES AND METHODS FOR THE RISK ASSESSMENT OF CHEMICALS IN FOOD

NOTE TO READERS OF THIS CRITERIA MONOGRAPH

The individual chapters of this monograph can largely stand alone; hence, a table of contents and reference list are included in each chapter, and some duplication may occur in the overall text. This publication will also be made available electronically, and individual chapters will be independently updated when the need arises.

Every effort has been made to present the information in this criteria monograph as accurately as possible without unduly delaying its publication. In the interest of all users of this Environmental Health Criteria monograph, readers are requested to communicate any errors that may have occurred to the Director of the Department of Food Safety and Zoonoses, World Health Organization, Geneva, Switzerland, in order that they may be included in corrigenda.

Environmental Health Criteria

PREAMBLE

Objectives

In 1973, the WHO Environmental Health Criteria Programme was initiated with the following objectives:

(i) to assess information on the relationship between exposure to environmental pollutants and human health, and to provide guidelines for setting exposure limits;
(ii) to identify new or potential pollutants;
(iii) to identify gaps in knowledge concerning the health effects of pollutants;
(iv) to promote the harmonization of toxicological and epidemiological methods in order to have internationally comparable results.

The first Environmental Health Criteria (EHC) monograph, on mercury, was published in 1976, and since that time an ever-increasing number of assessments of chemicals and of physical effects have been produced. In addition, many EHC monographs have been devoted to evaluating toxicological methodology, e.g. for genetic, neurotoxic, teratogenic, and nephrotoxic effects. Other publications have been concerned with epidemiological guidelines, evaluation of short-term tests for carcinogens, biomarkers, effects on the elderly, and so forth.

Since its inauguration, the EHC Programme has widened its scope, and the importance of environmental effects, in addition to health effects, has been increasingly emphasized in the total evaluation of chemicals.

The original impetus for the Programme came from World Health Assembly resolutions and the recommendations of the 1972 UN Conference on the Human Environment. Subsequently, the work became an integral part of the International Programme on Chemical Safety (IPCS), a cooperative programme of WHO, ILO, and UNEP. In

this manner, with the strong support of the new partners, the importance of occupational health and environmental effects was fully recognized. The EHC monographs have become widely established, used, and recognized throughout the world.

The recommendations of the 1992 UN Conference on Environment and Development and the subsequent establishment of the Intergovernmental Forum on Chemical Safety with the priorities for action in the six programme areas of Chapter 19, Agenda 21, all lend further weight to the need for EHC assessments of the risks of chemicals.

Scope

Two different types of EHC documents are available: 1) on specific chemicals or groups of related chemicals; and 2) on risk assessment methodologies. The criteria monographs are intended to provide critical reviews on the effect on human health and the environment of chemicals and of combinations of chemicals and physical and biological agents and risk assessment methodologies. As such, they include and review studies that are of direct relevance for evaluations. However, they do not describe *every* study carried out. Worldwide data are used and are quoted from original studies, not from abstracts or reviews. Both published and unpublished reports are considered, and it is incumbent on the authors to assess all the articles cited in the references. Preference is always given to published data. Unpublished data are used only when relevant published data are absent or when they are pivotal to the risk assessment. A detailed policy statement is available that describes the procedures used for unpublished proprietary data so that this information can be used in the evaluation without compromising its confidential nature (WHO (1990) Revised Guidelines for the Preparation of Environmental Health Criteria Monographs. PCS/90.69, Geneva, World Health Organization).

In the evaluation of human health risks, sound human data, whenever available, are preferred to animal data. Animal and in vitro studies provide support and are used mainly to supply evidence missing from human studies. It is mandatory that research on human subjects is conducted in full accord with ethical principles, including the provisions of the Declaration of Helsinki.

The EHC monographs are intended to assist national and international authorities in making risk assessments and subsequent risk management decisions. They represent a thorough evaluation of risks and are not, in any sense, recommendations for regulation or standard setting. These latter are the exclusive purview of national and regional governments.

Procedures

The procedures described below were followed in the development and publication of this EHC. A designated WHO Staff Member, Dr Sam Page and subsequently Dr A. Tritscher, served as the Responsible Officer (RO) at WHO. At the Food and Agriculture Organization of the United Nations (FAO), the ROs were Dr M. Lützow and subsequently Dr A. Wennberg. These ROs are responsible for the scientific content of the document. The editor was responsible for layout and language. A public web site was created to inform progress on the project.

FAO and WHO held a planning meeting of international experts with experience in the risk assessment activities of the Joint FAO/WHO Expert Committee on Food Additives (JECFA) and the Joint FAO/WHO Meeting on Pesticide Residues (JMPR) on 26–28 November 2001 at WHO Headquarters in Geneva, Switzerland, to define the scope of the project and develop a project plan. A steering group was then formed, which accompanied and guided the project until its completion.

A series of workshops were held to develop the basis for the key chapters. In addition, drafters were commissioned for certain subchapters, and these drafts were subsequently peer reviewed by the steering group and/or by invited experts. Once all chapters had been drafted, four experts familiar with the project as well as with the methods and procedures applied by JECFA and JMPR were commissioned for an overall review. Subsequently, two experts were commissioned to compile and write the first draft of the monograph based on existing chapters and taking into account comments from reviewers and the steering group. This draft monograph was then made available on the IPCS web site for external review and comment. Comments received are available on request from the WHO Secretariat. They were reviewed by an expert meeting held on 11–14 November 2008 in Seoul, Republic of

Korea, and necessary additions and revisions to the document were made.

All experts who contributed to this monograph served as individual scientists, not as representatives of any organization, government or industry. Every attempt was made to ensure that all individuals who, as authors, consultants or advisers, participated in the preparation of this EHC monograph informed the WHO Secretariat if at any time a conflict of interest, whether actual or potential, could be perceived in their work.

TASK GROUP ON ENVIRONMENTAL HEALTH CRITERIA ON PRINCIPLES AND METHODS FOR THE RISK ASSESSMENT OF CHEMICALS IN FOOD

Dr S. Page, IPCS, and Dr A. Tritscher, Department of Food Safety and Zoonoses, served as the Responsible Officers (ROs) for WHO, and Dr M. Lützow and Dr A. Wennberg served as the ROs for FAO. The ROs were responsible for the preparation of the final document and for its overall scientific content. Marla Sheffer, Ottawa, Canada, was the IPCS editor responsible for layout and language.

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Risk assessment activities of IPCS are supported financially by the Department of Health, Department for Environment, Food & Rural Affairs and Food Standards Agency, United Kingdom; Environmental Protection Agency, Food and Drug Administration and National Institute of Environmental Health Sciences, United States of America (USA); European Commission; German Federal Ministry of Environment, Nature Conservation and Nuclear Safety; Health Canada; Japanese Ministry of Health, Labour and Welfare; and Swiss Agency for Environment, Forests and Landscape. Specific support for this project was received from the United Kingdom Food Standards Agency, the United States Food and Drug Administration, the Republic of Korea Food and Drug Administration and the Netherlands National Institute for Public Health and the Environment.

* * *

Steering group members

Dr D. Arnold, Federal Institute for Health Protection of Consumers & Veterinary Medicine, Berlin, Germany

Professor J. Bend, Department of Pathology, Siebens-Drake Medical Research Institute, Schulich School of Medicine & Dentistry, University of Western Ontario, London, Ontario, Canada

Dr M. Bolger, Food and Drug Administration, United States Department of Health and Human Services, College Park, Maryland, USA

Dr E. Boutrif, Food Quality and Standards Service, Food and Nutrition Division, Food and Agriculture Organization of the United Nations, Rome, Italy

Mr D. Hamilton, Department of Primary Industries, Brisbane, Australia

Dr J.-L. Jouve, Chief, Food Quality and Standards Service, Food and Nutrition Division, Food and Agriculture Organization of the United Nations, Rome, Italy (*retired*)

Dr M. Lützow, Consultant, Neuenhof, Switzerland

Dr T. Meredith, International Programme on Chemical Safety, World Health Organization, Geneva, Switzerland

Dr B. Petersen, Exponent, Inc., Washington, DC, USA

Dr G. Vaagt, Pesticide Management Group, Food and Agriculture Organization of the United Nations, Rome, Italy

Professor R. Walker, School of Biological Sciences, Guildford, Surrey, England

Dr Y. Yamada, National Food Research Institute, Tsukuba, Japan

Secretariat

Dr M. Choi, Department of Food Safety and Zoonoses, World Health Organization, Geneva, Switzerland

Dr S. Page, International Programme on Chemical Safety, World Health Organization, Geneva, Switzerland

Dr A. Tritscher, Department of Food Safety and Zoonoses, World Health Organization, Geneva, Switzerland

Dr A. Wennberg, Nutrition and Consumer Protection Division, Food and Agriculture Organization of the United Nations, Rome, Italy

Other contributors

The contributors to this monograph are listed below. Those who submitted written comments in response to a request for public comments are also acknowledged below.

Invited reviewers of the draft chapters were Dr S. Barlow, Dr A. Boobis, Dr J. Herrman and Dr J. Weatherwax.

Dr S. Barlow and Professor A. Renwick compiled and prepared the first draft of the monograph based on the draft chapters and taking into account comments from reviewers and the steering group.

Legend

1	Participant in: Workshop I, London, 9–13 December 2002: Joint FAO/WHO Project to Update Principles and Methods for the Risk Assessment of Chemicals in Food (*basis for chapter 4*)
2	Participant in: Joint FAO/WHO Expert Consultation: Dietary Exposure Assessment of Chemicals in Food, Annapolis, Maryland, USA, 2–6 May 2005 (*basis for chapter 6*)
3	Participant in: Joint FAO/WHO Expert Consultation: MRLs for Pesticides and Veterinary Drugs, Bilthoven, the Netherlands, 7–10 November 2005 (*basis for chapter 9*)
4	Participant in: Workshop on Principles for Modelling Dose–Response for the Risk Assessment of Chemicals, Geneva, 13–17 September 2004 (*basis for chapter 5*)
5	Participant in: Final Expert Meeting, 11–14 November 2008, Seoul, Republic of Korea
6	Drafter of section or chapter (chapter indicated in parentheses)

Dr A. Ambrus, Hungarian Food Safety Office, Budapest, Hungary	2, 3
Professor A. Anadón, Department of Toxicology and Pharmacology, Faculty of Veterinary Medicine, Universidad Complutense de Madrid, Madrid, Spain	1
Dr D. Arnold, Consultant, Berlin, Germany (formerly Federal Institute for Health Protection of Consumers & Veterinary Medicine, Berlin, Germany) (*3: Chair*)	1, 3, 5, 6 (chapter 3)
Dr S.A. Assimon, Center for Food Safety and Applied Nutrition, Food and Drug Administration, College Park, MD, USA	6 (section 4.10)
Ms J. Baines, Evaluation and Surveillance, Food Standards Australia New Zealand, Canberra, Australia (*2: Rapporteur*)	2, 5
Dr S. Barlow, Consultant, Brighton, England (*5: Chair*)	5, 6 (section 4.7)
Dr L. Barraj, Exponent, Inc., Washington, DC, USA	2

Dr D. Bellinger, Harvard Medical School Children's Hospital, Boston, MA, USA	1
Dr D. Benford, Food Standards Agency, London, England	1, 5
Dr M. Bolger, Center for Food Safety and Applied Nutrition, Food and Drug Administration, College Park, MD, USA (*4: Rapporteur*)	1, 2, 4
Professor A. Boobis, Experimental Medicine & Toxicology Division of Investigative Science, Faculty of Medicine, Imperial College, London, England (*1,4: Chair*) (*5: Rapporteur*)	1, 4, 5, 6 (sections 4.1, 4.6)
Dr A. Bruno, FAO Codex Secretariat, Food and Agriculture Organization of the United Nations, Rome, Italy	3
Professor E. Calabrese, University of Massachusetts, Amherst, MA, USA	4
Dr E. Caldas, University of Brasilia, College of Health Sciences, Pharmaceutical Sciences Department, Campus Universitàrio Darci Ribeiro, Brasilia, Brazil	2, 3
Dr C. Carrington, Center for Food Safety and Applied Nutrition, Food and Drug Administration, College Park, MD, USA	2, 4, 5, 6 (chapter 5)
Dr C. Cerniglia, Division of Microbiology, National Center for Toxicological Research, Food and Drug Administration, Jefferson, AR, USA	1, 6 (section 4.12)
Mrs R. Charrondiere, Nutrition Planning, Assessment and Evaluation Service, Nutrition and Consumer Protection Division, Food and Agriculture Organization of the United Nations, Rome, Italy	2
Professor B. Chen, School of Public Health, Shanghai Medical University, Shanghai, China	1
Dr M.-H. Cho, National Institute of Toxicological Research, Korean Food and Drug Administration, Seoul, Republic of Korea	5
Dr M. Choi, Korean Food and Drug Administration, Seoul, Republic of Korea (formerly Department of Food Safety and Zoonoses, World Health Organization, Geneva, Switzerland)	5
Dr V. Cogliano, Carcinogen Identification and Evaluation, International Agency for Research on Cancer, World Health Organization, Lyon, France	4
Dr J. Cohen, Harvard Center for Risk Analysis, Boston, MA, USA	2

Dr R. Crebelli, Unit of Genetic Toxicology, Department of Environment and Primary Prevention, Istituto Superiore di Sanita, Rome, Italy	6 (section 4.5)
Professor A. Dayan, Consultant, London, England	1, 6 (section 4.11)
Dr D. Deuk Jang, National Institute of Toxicological Research, Korean Food and Drug Administration, Seoul, Republic of Korea	5
Dr M. DiNovi, Center for Food Safety and Applied Nutrition, Food and Drug Administration, College Park, MD, USA	2
Professor E. Dybing, Division of Environmental Medicine, Norwegian Institute of Public Health, Oslo, Norway (retired) (*4: Rapporteur*)	4
Dr L. Edler, Biostatistics Unit, German Cancer Research Center, Heidelberg, Germany	4
Ms S.K. Egan, Center for Food Safety and Applied Nutrition, Food and Drug Administration, College Park, MD, USA (*2: Rapporteur*)	2
Dr R. Ellis, Consultant, South Carolina, USA (formerly Center for Veterinary Medicine, Food and Drug Administration, Rockville, MD, USA) (*3: Rapporteur*)	3
Professor P. Farmer, Department of Biochemistry and Department of Cancer Studies and Molecular Medicine, University of Leicester, Leicester, England	6 (section 4.5)
Professor E. Faustman, Department of Environmental and Occupational Health Sciences, School of Public Health and Community Medicine, University of Washington, Seattle, WA, USA	4
Dr C. Fisher, Consultant, Cambridge, England	1, 6 (chapter 3)
Dr S. Funk, Health Effects Division, United States Environmental Protection Agency, Washington, DC, USA	2, 3
Dr G. Gallhoff, Health and Consumer Protection Directorate-General, European Commission, Brussels, Belgium	3
Dr W. Gelderblom, Programme on Mycotoxins and Experimental Carcinogenesis (PROMEC), Tygerberg, South Africa	1
Dr D. Germolec, National Institute of Environmental Health Sciences, Research Triangle Park, NC, USA	6 (section 4.9)
Dr K. Greenlees, Toxicology Team, Office of New Animal Drug Evaluation, Center for Veterinary Medicine, Food and Drug Administration, Rockville, MD, USA	3

Mr D. Hamilton, Consultant, Brisbane, Australia (formerly Biosecurity, Department of Primary Industries and Fisheries, Brisbane, Australia) (*3: Rapporteur*)	1, 3, 5, 6 (chapters 1, 8)
Dr C.A. Harris, Exponent International Ltd, Harrogate, England	3
Dr G.J. Harry, National Institute of Environmental Health Sciences, National Institutes of Health, Research Triangle Park, NC, USA	1, 6 (section 4.8)
Dr M. Healy, Food Standards Australia New Zealand, Canberra, Australia	4
Dr J. Herrman, Consultant, Placerville, CA, USA	1, 6 (chapter 1)
Dr J. Hlywka, Cantox Health Sciences International, Mississauga, Ontario, Canada	1, 6 (sections 4.10, 4.11)
Mr J. Howlett, Consultant, Surrey, England	4
Dr T. Inoue, Biological Safety Research Centre, National Institute of Health Sciences, Tokyo, Japan	1
Dr S.-H. Jeong, Toxicology Division, National Veterinary Research and Quarantine Service, Ministry of Agriculture & Forestry, Anyang City, Republic of Korea	5
Dr J.-L. Jouve, Food Quality and Standards Service, Food and Nutrition Division, Food and Agriculture Organization of the United Nations, Rome, Italy (retired)	1
Dr M. Kaethner, Bayer CropScience AG, Monheim, Germany	3
Dr R. Kavlock, United States Environmental Protection Agency, Research Triangle Park, NC, USA	1, 6 (section 4.7)
Dr J. Kleiner, European Food Safety Authority, Parma, Italy	4
Dr A. Knaap, Center for Substances and Integrated Risk Assessment, National Institute for Public Health and the Environment (RIVM), Bilthoven, the Netherlands (retired)	4
Dr P. Kuznesof, Silver Spring, MD, USA	6 (chapter 3)
Dr J. Larsen, National Food Institute, Technical University of Denmark, Soborg, Denmark	4
Dr J.-C. Leblanc, Department for the Evaluation of Nutritional and Health Risks, French Food Safety Agency (AFSSA), Maisons Alfort, France	2
Dr C. Leclercq, Research Group on Food Safety – Exposure Analysis, National Institute for Food and Nutrition Research (INRAN), Rome, Italy	2

Dr H.M. Lee, Risk Assessment Research Team, National Institute of Toxicological Research, Korea Food and Drug Administration, Seoul, Republic of Korea	5
Professor P. Lees, The Royal Veterinary College, Hawkshead Lane, North Mymms, Hatfield, England	3
Dr D. Lovell, Postgraduate Medical School, University of Surrey, Surrey, England	4
Dr R. Luebke, National Institute of Environmental Health Sciences, National Institutes of Health, Research Triangle Park, NC, USA	6 (section 4.9)
Dr M. Luster, National Institute for Occupational Safety and Health, Morgantown, WV, USA	6 (section 4.9)
Dr M. Lützow, Consultant, Neuenhof, Switzerland	1, 3, 5
Dr D. MacLachlan, Australian Quarantine and Inspection Service, Australian Department of Agriculture, Fisheries and Forestry, Kingston, Australia	3
Dr J.D. MacNeil, Center for Veterinary Drug Residues, Canadian Food Inspection Agency, Saskatoon, Saskatchewan, Canada	3, 6 (chapter 3)
Dr C. Madsen, Institute of Food Safety and Toxicology, Danish Veterinary and Food Administration, Copenhagen, Denmark	6 (section 4.10)
Dr A. Mattia, Division of Biotechnology and GRAS Notice Review, Office of Food Additive Safety, Center for Food Safety and Applied Nutrition, Food and Drug Administration, College Park, MD, USA	1, 6 (section 4.3)
Dr D. McGregor, Consultant, Aberdour, Scotland	1, 6 (section 4.5)
Dr T. Meredith, International Programme on Chemical Safety, World Health Organization, Geneva, Switzerland	1
Mr D.J. Miller, United States Environmental Protection Agency, Washington, DC, USA	2
Professor E. Mitema, Department of Public Health, Pharmacology and Toxicology, Faculty of Veterinary Medicine, College of Agriculture and Veterinary Sciences, University of Nairobi, Kenya	1
Dr A. Moretto, Department of Environmental and Occupational Health, University of Milan, International Centre for Pesticides and Health Risk Prevention (ICPS), Milano, Italy	1
Dr G. Moy, Consultant, Geneva, Switzerland (previously Department of Food Safety and Zoonoses, World Health Organization, Geneva, Switzerland)	1, 2

Dr I. Munro, Cantox Health Sciences International, Mississauga, Ontario, Canada (*1: Rapporteur*)	1, 6 (sections 4.1, 9.1)
Dr J.L. Nappier, Pfizer Animal Health, Kalamazoo, MI, USA	3
Dr B.C. Ossendorp, Centre for Substances and Integrated Risk Assessment, National Institute for Public Health and the Environment (RIVM), Bilthoven, the Netherlands (*3: Co-Chair*)	2, 3
Dr S. Page, Consultant, New Castle, USA (formerly International Programme on Chemical Safety, World Health Organization, Geneva, Switzerland)	1, 2, 3, 4, 6 (chapters 1, 2)
Dr B. Petersen, Exponent, Inc., Washington, DC, USA (*2: Chair*)	1, 2
Professor R. Pieters, University of Utrecht, Utrecht, the Netherlands	6 (section 4.10)
Dr C. Portier, National Institute for Environmental Health Sciences, Research Triangle Park, NC, USA	4
Professor A. Renwick, Consultant, Ulverston, Cumbria, England	1, 4, 5, 6 (section 4.2, chapters 5, 7)
Professor F. Reyes, Department of Food Science, State University of Campinas, Campinas, Brazil	1
Ms A. Richter, Federal Institute for Risk Assessment, Berlin, Germany	3
Dr R. Roberts, AstraZeneca R&D, Safety Assessment, Alderly Park, England	6 (section 4.6)
Dr J.C. Rühl, DuPont Crop Protection, Newark, NJ, USA	2
Professor T. Sanner, Laboratory for Environmental and Occupational Cancer, Institute for Cancer Research, The Norwegian Radium Hospital, Oslo, Norway	4
Dr J. Schefferlie, Centre for Substances and Integrated Risk Assessment, National Institute for Public Health and the Environment (RIVM), Bilthoven, the Netherlands	3
Dr S. Scheid, Federal Office of Consumer Protection and Food Safety, Berlin, Germany	3
Dr J. Schlatter, Consumer Protection Directorate, Food Safety Division, Nutritional and Toxicological Risks Section, Swiss Federal Office of Public Health, Zürich, Switzerland	1, 4
Dr R. Setzer, Jr, Experimental Toxicology Division, Pharmacokinetics Branch, National Health and Environmental Effects Research Laboratory, United States Environmental Protection Agency, Research Triangle Park, NC, USA	4

Professor W. Slob, National Institute for Public Health and the Environment (RIVM), Bilthoven, the Netherlands	4
Dr R. Solecki, Safety of Substances and Preparations, Coordination and Overall Assessment, Federal Institute for Risk Assessment, Berlin, Germany	4, 6 (sections 4.4, 5.2.8)
Dr A.F. Suárez, Instituto Nacional de Tecnología Agropecuaria, Centro de Agroalimentos, Buenos Aires, Argentina	3
Dr S.F. Sundlof, Center for Food Safety and Applied Nutrition (formerly Center for Veterinary Medicine), Food and Drug Administration, Rockville, MD, USA	3
Dr C. Taylor, Institute of Medicine, The National Academies, Washington, DC, USA	6 (section 9.2)
Dr A. Tejada, Pesticide Management Group, Plant Protection Service, Plant Production and Protection Division, Food and Agriculture Organization of the United Nations, Rome, Italy (retired)	1, 2
Dr A. Tritscher, Department of Food Safety and Zoonoses (formerly International Programme on Chemical Safety), World Health Organization, Geneva, Switzerland	3, 4, 5, 6 (chapters 1, 2)
Dr W. van Eck, The Food and Consumer Product Safety Authority, The Hague, the Netherlands	6 (chapter 1)
Dr R.W. Vannoort, ESR Christchurch Science Centre, Christchurch, New Zealand	2
Dr P. Verger, National Institute for Agricultural Research (INRA), Paris, France	2
Dr J. Vos, Laboratory for Pathology and Immunology, National Institute for Public Health and the Environment (RIVM), Bilthoven, the Netherlands	1, 6 (section 4.9)
Dr A. Wadge, Food Standards Agency, London, England	4
Professor R. Walker, Consultant, Guildford, Surrey, England (formerly School of Biological Sciences, Guildford, Surrey, England)	1, 5, 6 (section 4.12, chapter 5)
Dr A. Wennberg, FAO Joint Secretary, Food Quality and Standards Service, Nutrition and Consumer Protection Division, Food and Agriculture Organization of the United Nations, Rome, Italy	3, 5, 6 (chapter 3)
Professor C.P. Wild, International Agency for Research on Cancer, World Health Organization, Lyon, France (formerly University of Leeds, Leeds, England)	1

Professor G. Williams, Environmental Pathology and Toxicology, New York Medical College, Valhalla, NY, USA	1, 4, 6 (section 4.6)
Dr Y. Yamada, Ministry of Agriculture, Forestry and Fisheries, Tokyo, Japan	1, 6 (chapter 1)
Professor J.-H. Yang, Catholic University of Taegu, Department of Pharmacology/Toxicology, School of Medicine, Namgu Taegu, Republic of Korea	5
Dr H.J. Yoon, Korean Food and Drug Administration, Seoul, Republic of Korea (formerly Department of Food Safety, Zoonoses and Foodborne Diseases, World Health Organization, Geneva, Switzerland)	3

The following individuals submitted written comments in response to the request for public comments on the final draft monograph:

B. Amzal (European Food Safety Authority)

Dr K.C. Angelova (Bulgaria)

Dr D. Benford (England)

A. Bulder (RIKILT Institute of Food Safety, Wageningen, the Netherlands)

R. Crebelli (European Food Safety Authority)

S. Fabiansson (European Food Safety Authority)

Professor P.B. Farmer (England)

D. Hamilton (Biosecurity Queensland, Australia)

J. Hopkins (Consultant, England)

O. Lindtner (Federal Institute for Risk Assessment, Germany)

C. Madsen (Denmark)

Dr H. Marvin (RIKILT Institute of Food Safety, Wageningen, the Netherlands)

D. Morris (New Zealand)

J. Nicholas (Committee for Medicinal Products for Veterinary Use)

B. Ossendorp (National Institute for Public Health and the Environment, the Netherlands)

Dr R.H. Waring (European Food Safety Authority)

PREFACE

The International Programme on Chemical Safety (IPCS) was initiated in 1980 as a collaborative programme of the United Nations Environment Programme (UNEP), the International Labour Organization (ILO), and the World Health Organization (WHO). One of the major objectives of IPCS is to improve scientific methodologies for assessing the effects of chemicals on human health and the environment. As part of this effort, IPCS publishes a series of monographs, called Environmental Health Criteria (EHC) documents, that evaluate the scientific principles underlying methodologies and strategies to assess risks from exposure to chemicals.

This EHC was prepared in response to a recommendation that the Food and Agriculture Organization of the United Nations (FAO) and WHO should consider updating and harmonizing all the common principles used by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) and the Joint FAO/WHO Meeting on Pesticide Residues (JMPR) in the toxicological evaluation of food chemicals and publish the information in a single consolidated document. It updates, harmonizes and consolidates principles and methods for the risk assessment of food additives, food contaminants, natural toxicants and residues of pesticides and veterinary drugs.

The efforts of all who helped in the preparation, review, and finalization of the monograph are gratefully acknowledged. Special thanks are due to Health Canada, the Ministry of Health of Japan, the United Kingdom Food Standards Agency and the United States National Institute of Environmental Health Sciences for their financial support of the project.