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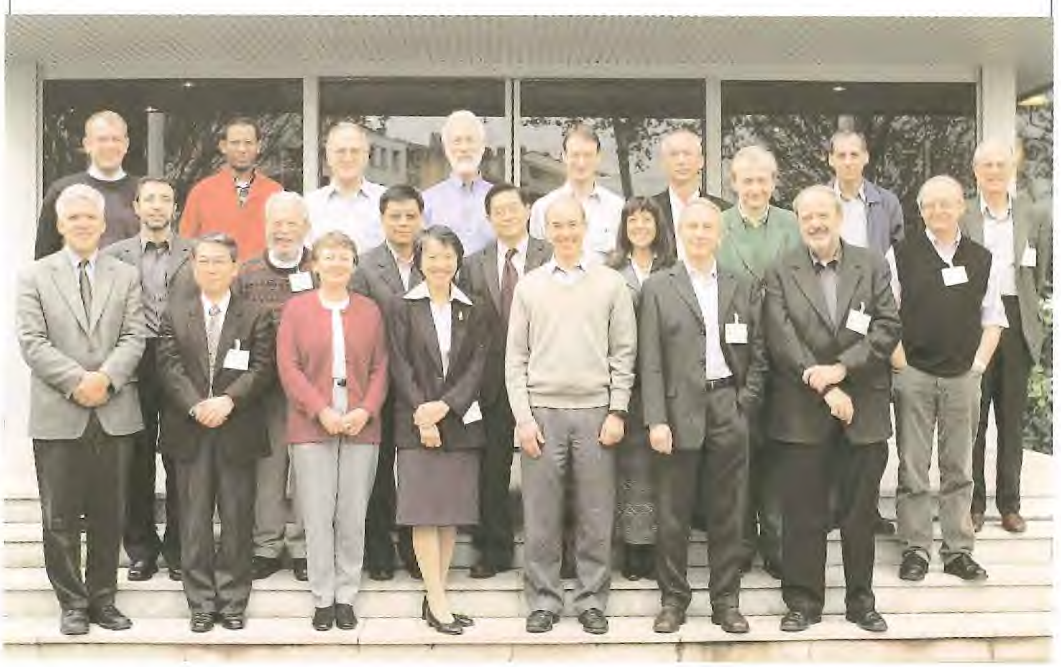
The International Agency for Research on Cancer (IARC) was established in 1965 by the World Health Assembly, as an independently financed organization within the framework of the World Health Organization. The headquarters of the Agency are in Lyon, France.

The Agency conducts a programme of research concentrating particularly on the epidemiology of cancer and the study of potential carcinogens in the human environment. Its field studies are supplemented by biological and chemical research carried out in the Agency's laboratories in Lyon and, through collaborative research agreements, in national research institutions in many countries. The Agency also conducts a programme for the education and training of personnel for cancer research.

The publications of the Agency contribute to the dissemination of authoritative information on different aspects of cancer research. Information about IARC publications, and how to order them, is available via the Internet at: http://www.iarc.fr/

This publication represents the views and opinions of an IARC Working Group on the Evaluation of Cancer Preventive Strategies which met in Lyon, France, 18–24 November 2003



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Note to the Reader

Anyone who is aware of published data that may influence any consideration in these *Handbooks* is encouraged to make the information available to the Unit of Chemoprevention, International Agency for Research on Cancer, 150 Cours Albert Thomas, 69372 Lyon Cedex 08, France

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Preface

Why a Handbook on cruciferous vegetables, isothiocyanates and indoles

Nutritional epidemiology provides the only direct approach to the assessment of the health effects of the human diet. During the past 10 years, various study designs and sophisticated methods have been used to establish relationships between dietary habits and risks for noncommunicable diseases, including cancer. In the light of reports that fruit and vegetables are important dietary components for reducing the risks for various cancers, IARC considered it important to evaluate the current evidence on the health effects of a diet rich in fruit and vegetables.

Volume 8 of the *IARC Handbooks of Cancer Prevention* confirmed that a high consumption of fruit and vegetables is associated with lower risks for cancer at several sites. More specifically, the final evaluation stated that consumption of fruit probably lowers the risks for cancers of the oesophagus, stomach and lung, while consumption of vegetables probably lowers the risks for cancers of the oesophagus and colorectum. Various fruit and vegetables have been investigated separately, to identify the most effective cancer preventing groups and active ingredients. Cruciferous vegetables have been considered good candidates.

Consumption of cruciferous vegetables, such as broccoli, cabbage, cauliflower, watercress and Brussels sprouts, was shown to be associated with decreased risks for cancer in epidemiological studies In the 1980s. These vegetables contain substantial amounts of glucosinolates, which are hydrolysed to isothiocyanates and indoles when normal portions of these raw vegetables are chewed or otherwise macerated. Experimental studies have shown that these compounds inhibit carcinogenesis, and plausible mechanisms of action have been investigated extensively.

This *Handbook* provides an up-to-date review of knowledge on the efficacy of cruciferous vegetables and naturally occurring isothiocyanates and indoles as chemopreventive agents. Data from human, experimental and mechanistic studies are reviewed. In the epidemiological studies, cancer risk was examined in relation to consumption of cruciferous vegetables, which was assessed either from food frequency questionnaires or by measuring markers of cruciferous vege-table intake. In some recent studies of intake, individuals were stratified on the basis of genetic polymorphisms.

The volume also provides recommendations for future research and public health action.