GENERAL REMARKS

This ninety-seventh volume of *IARC Monographs* contains evaluations of the carcinogenic hazard to humans of 1,3-butadiene, ethylene oxide and some vinyl halides (vinyl fluoride, vinyl chloride and vinyl bromide). The most recent previous evaluations of these industrial gases were published in Supplement 7 (IARC, 1987) for vinyl chloride, Volume 60 (IARC, 1994) for ethylene oxide, Volume 63 (IARC, 1995) for vinyl fluoride and Volume 71 (IARC, 1999) for 1,3-butadiene and vinyl bromide. Newer epidemiological and mechanistic studies have since been published and are evaluated in this volume.

Numbers of exposed workers

No estimates of numbers of exposed workers worldwide are available. National estimates have been reported for the USA (National Occupational Exposure Survey, NOES) and for the member states of the European Union (CAREX information system on occupational exposure to carcinogens).

NOES was a nationwide observational survey that was conducted in a sample of 4490 establishments from 1981 to 1983. The target population was defined as employees working in establishments or job sites in the USA that employed eight or more workers in a category defined in the list of Standard Industrial Classifications. Generally, these classifications mainly covered construction, manufacturing, transportation, private and business services and hospital industries. The NOES sampled little or no activity in agriculture, mining, wholesale/retail trade, finance/real estate or government operations. NOES addressed recordable potential exposure that had to meet two criteria: (1) a chemical, physical or biological agent or trade-name product had to be observed in sufficient proximity to an employee such that one or two physical phases of that agent or product probably came into contact or entered the body of the employee; and (2) the duration of the potential exposure had to meet the minimal duration guidelines, i.e., it must have presented a potential exposure for at least 30 min per week (on an annual average) or be used at least once per week for 90% of the weeks or the work year (NOES, 1997).

The CAREX information system was designed to provide selected exposure data and documented estimates of the number of workers exposed to carcinogens by country, carcinogen and industry for 15 Member States of the European Union. CAREX includes

data on agents that have been evaluated by the IARC (all agents in Groups 1 and 2A as of February 1995, and selected agents in Group 2B) and on ionizing radiation that were displayed across 55 industrial classes. The minimal criterion for exposure was defined agent by agent. In general, workers were considererd to have been exposed if a specified background level was exceeded. Occupational exposures for 1990–93 were estimated in two phases. Firstly, estimates were generated by the CAREX system on the basis of data from national labour forces and estimates of exposure prevalence from two reference countries (Finland and the USA) that had the most comprehensive data available on exposures to these agents. Thereafter, these estimates were refined for selected countries (Finland, France, Germany, Italy, the Netherlands, Spain, Sweden, the United Kingdom) by national experts with regard to the perceived exposure patterns in their own countries compared with those of the reference countries (Kauppinen *et al.*, 2000).

The figures of NOES and CAREX are not comparable because definitions of exposure, data collection and estimation methods were different. The inclusion or exclusion of workers exposed only occasionally, or to very low levels that were close to the background levels, may strongly influence the estimates. The NOES estimates (from 1981 to 1983) and CAREX estimates (from 1990 to 1993) are also fairly old and the extent of exposure may have changed considerably since then.

Classification of lymphomas

The diagnosis and classification of haematopoietic and lymphopoietic malignancies are extremely complex and have undergone successive changes over the course of time. The original classification was based largely on morphology of the tumour cells and this was reflected in the 9th International Classification of Diseases (ICD-9) categories 200–208 (WHO, 1975). The more recent WHO classification (Jaffe *et al.*, 2001) considers more recent developments in cytogenetics and molecular biology and has little overlap with the ICD-9 classification (WHO, 1975). Also a distinction between ICD-9 200 and 202 is probably not meaningful in the light of the WHO re-classification. It has to be noted that this WHO classification was superseded in 2008 (Swerdlow *et al*., 2008).

The major change in the WHO classification is that lymphocytic leukaemias and lymphomas are no longer considered to be different diseases. Rather, the essential feature of the definition is the tumour cells, and a neoplasm of a particular lymphoid cell type may present as either leukaemia or a solid tumour mass (lymphoma) in a given patient. This has a bearing on the assessment of associations with exposures in epidemiological studies, which previously considered leukaemias (all types combined, or specific categories such as acute lymphocytic leukaemia) separately from non-Hodgkin lymphomas. The WHO classification indicates that the previous practice is no longer appropriate and that lymphomas and leukaemias should be combined in tabulations of the incidence of disease, at least for leukaemias and lymphomas of the same cell type, e.g. chronic lymphocytic leukemia/small lymphocytic lymphoma. However, this

reclassification is difficult or impossible to achieve in epidemiological studies that rely on death certificates issued many years ago.

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