GOALS FOR CANCER PREVENTION

A tentative estimate of the reduction in the incidence of cancer that can be achieved in a given population or region of the world could be made by calculating the differences between the highest and the lowest observed rates for a given site in populations which are not too dissimilar genetically. One can assume that, at least in theory, the lowest rates observed in populations where a reliable cancer registry exists, would be suitable target levels for primary prevention programme. Within Europe for instance this would imply that in males a reduction in incidence of 72% could be achieved for large bowel cancer (from 44.0 to 12.1 cases per 10^5), of 78% for lung cancer (from 110.4 to 24.5 per 10^5), of 69% for bladder cancer (from 24.7 to 7.7 per 10^5). If we push this theoretical estimate a bit further and extend it to the incidence of cancers at all sites, the total reduction within Europe could be from the present maximum rate of between 330 and 240 cases per 10^5 per annum, to an incidence of between 164 and 105 cases per 10^5 per annum, an incidence calculated by adding together the lowest incidences observed in European populations for each site (1).

This theoretical exercise has the merit of giving an idea of the order of magnitude of the variability in risks in different regions and in different populations of the world, and therefore, indirectly of the important role environmental factors may play in determining cancer risks. It certainly does not provide any indication as to the actual feasibility and efficacy of specific preventive measures, nor more importantly, does it take into account our still limited knowledge of the causes of human cancer, nor, for the causes we know, the extent to which they would be amenable to primary prevention. Although many more etiological agents of human cancer are known today than 50 years ago, they explain only an ill-defined proportion of all human cancers, and not the majority. The list of recognized carcinogenic agents for humans seems to reflect the male domination of our society, as it is to a large extent composed of agents related to cancers occurring predominantly in males. There are at least three reasons for such sex-related unevenness:

1 not much is known, beyond a number of credible but as yet still unproven hypotheses, on the etiology of the two most important female cancers, namely of the breast and of the cervix;
2 many of the recognized human carcinogens are related to occupational exposures, which are of greater concern to males than to females;

3 females have taken up the habit of cigarette smoking much later than males

This latter fact has made the lung an important target organ for cancer in females in Western societies only in quite recent years, an importance that still appears to be growing.

The IARC Monograph Programme

The IARC has contributed considerably (Tables 1, 2, 3, 4) to the preparation of this list with a programme initiated in 1969, and centered on the preparation of monographs on individual chemical compounds, groups of compounds or complex exposures. In these assessments, all available data relevant to the carcinogenicity of the exposure in question are critically analysed before an actual evaluation of carcinogenic risk for humans is made (2). A first tentative list of chemical agents definitely carcinogenic to humans was made in 1978, summarizing the data analysed in the first 20 Monographs volumes (3). This list was updated in 1982 using the data contained in Supplement no. 4 to the IARC Monographs which summarized and updated the information contained in the 29 volumes of monographs published until then (4). A further updating, carried out in 1987, resulted in the publication of Supplement 7, covering all the data contained in the 42 volumes of the Monographs published until then (5).

According to the criteria for carcinogenicity used within the IARC programme, elaborated in collaboration with expert advisors, chemicals, groups of chemicals or complex exposures are assigned to four groups, according to the evidence for carcinogenicity that exist for each of them: Group 1 - carcinogenic to humans; Group 2A - probably carcinogenic to humans; Group 2B - possibly carcinogenic to humans; Group 3 - not classifiable as to carcinogenicity to humans; and Group 4 - probably not carcinogenic to humans. The assignment of an agent to a group is made according to a scientific judgement that reflects the strength of the evidence derived from studies in humans and in experimental animals, and from other relevant data (5).

The assignment of the chemicals, groups of chemicals or complex exposures to Group 1 is based, however, solely on evidence for carcinogenicity in humans provided by epidemiological studies, and does not take into account any experimental data.

Experimental versus epidemiological data

There could be a variety of reasons why a chemical, for which there is sufficient experimental evidence of carcinogenicity and to which humans are exposed, has not been the subject of an epidemiological investigation (6). Some reflect the difficulties intrinsic to the epidemiological approach: the number of individuals exposed may be too small to provide statistically meaningful results, the duration of exposure may be too short to permit any conclusion to be drawn from a retrospective study, the chemical of interest may be just one among the many to which the individuals are exposed. Other reasons are of a different nature, among which is prominent the considerable socio-economic importance of certain substances. The changeable and, to a certain extent, unpredictable way people perceive risk may also play a role. Most people, in fact, support and urge rapid decisions on risks that are sharply peaked in time, and tend to disregard risks which span a long period of time - an attitude which is, for instance, at the root of the persistence of smokers to maintain their habit, in spite of the many warnings of its long-term adverse effects.