WORLD HEALTH ORGANIZATION

INTERNATIONAL AGENCY FOR RESEARCH ON CANCER

AGE-RELATED FACTORS IN CARCINOGENESIS

Proceedings of a symposium organized by the IARC and the N.N. Petrov Research Institute of Oncology, held in Leningrad, 7-9 December 1983

EDITORS

A. LIKHACHEV, V. ANISIMOV & R. MONTESANO

IARC SCIENTIFIC PUBLICATIONS No. 58

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The International Agency for Research on Cancer (IARC) was established in 1965 by the World Health Assembly, as in independently financed organization within the framework of the World Health Organization. The headquarters of the Agency are at 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 are intended to contribute to the dissemination of authoritative information on different aspects of cancer research.

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FOREWORD

The possibility of a relationship between the ageing process and carcinogenesis has long been discussed. Not only does cancer account for a large proportion of deaths in older people, but the number of people in age groups at greatest risk for cancer is increasing considerably in industrialized as well as non-industrialized countries.

The Agency was therefore pleased to collaborate with the N.N. Petrov Institute of Oncology in Leningrad in organizing the meeting of which these are the proceedings. It is hoped that the views of the international group of experts who presented papers at the meeting will serve to clarify this issue.

I should like to thank Dr N. Napalkov, Director of the N.N. Petrov Research Institute Oncology, for hosting the meeting.

L. Tomatis, M.D.
Director, IARC

INTRODUCTION

It is well known that morbidity and mortality rates due to cancer are higher in people in older age groups. The hypothesis that there is a relationship between the process of ageing and the process of cancer development was formulated many years ago and has subsequently been a subject of debate in the international scientific community.

This publication constitutes the proceedings of a meeting held in Leningrad, USSR, in December 1983, at which scientists from the USSR, the USA, the UK, Scandinavia, Germany and Japan presented various viewpoints on this topic. The phenomena of cancer and ageing are described on the basis of immunological, hormonal, physiological, biochemical, kinetic and metabolic parameters; and studies are described on both the epidemiology of cancer and on experimental carcinogenesis at the cellular and molecular levels.

The papers contained in these proceedings reflect very different approaches to this area of research and should throw some light on issues that have been discussed over the last few decades.

The Editors

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RELATION OF HUMAN CANCER MORBIDITY TO AGE: GENERAL PATTERNS AND EXCEPTIONS IN THE USSR

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There is, at present, a tendency for a rise in morbidity and mortality from malignant neoplasms in all industrialized countries, including the USSR (Fig. 1) (Napalkov *et al.*, 1978).

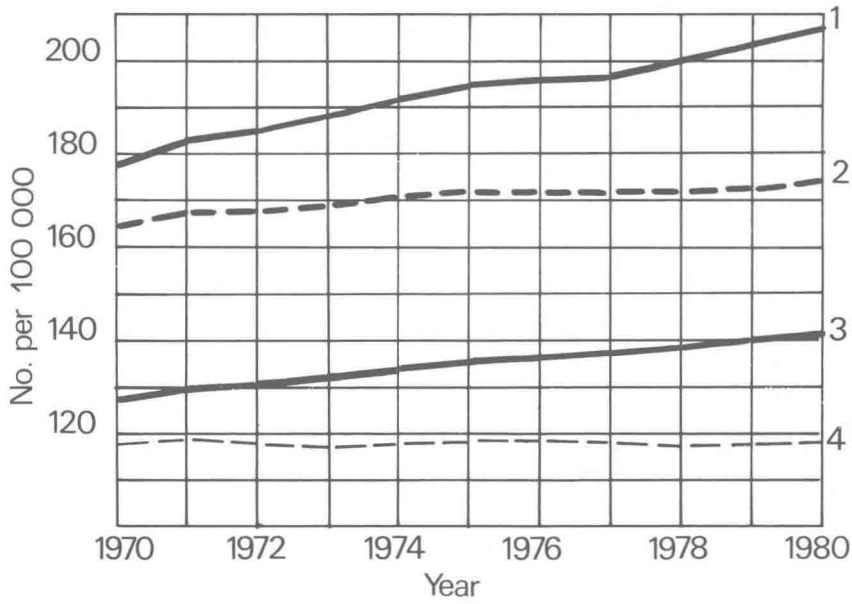
The highest levels of cancer morbidity in the USSR occur almost always in older age groups: about 80% of all newly detected cancers are found in the age group 50 years and older; every other primary cancer patient is over 60 years of age. The numbers of patients over 50 years are especially high for such cancer sites as oesophagus (91%), lung (86%), rectum (85%), stomach (84%) and skin (82%).

The rank morbidity distribution of the main tumour sites is significantly different in men and women of older age groups. Thus, for women in the age group 50-59 years, cancers of the breast, cervix uteri and stomach occupy the first three places; for men, the first three sites are lung, stomach and skin (Table 1). For women of 60-69 years of age, stomach cancer is first, skin cancer second and then cancers of the cervix uteri and breast; in men of the same age, cancers of the lung, stomach and skin retain the first three places. For women aged 70 and older, stomach cancer occupies the first place and is followed by skin and breast cancers; in men over 70, stomach cancer also occupies the first place, lung cancer ranks second, and skin cancer third (Tables 2 & 3).

The 'crude' cancer morbidity index for men only slightly exceeds that for women (208.9/100 000 *versus* 201.9/100 000). However, the standardized indices (225.3/100 000 and 147.8/100 000, respectively) suggest a direct relationship with the different age patterns of the male and female population, which results in a higher cancer incidence in women.

Computation of specific age-adjusted indices gives more reliable data for comparative analysis. Thus, cancer morbidity in men in general is 1.5 times higher than in women of the same age; in men of 70 and older it is two times higher than in women of the same age group (1388.3/100 000 and 697/100 000, respectively). Combined age- and sex-adjusted indices for certain tumour sites reveal even more significant differences in cancer morbidity between men and women; for instance, in men of 70 and older the frequency of laryngeal cancer is 42 times higher than in women of the same age.

Figure 1. Cancer morbidity and mortality in the population of the USSR, 1970-1980; 1, crude morbidity; 2, standardized (M. Segi) morbidity; 3, crude mortality; 4, standardized mortality



Specific age-adjusted rates of cancer morbidity in males and females increase with age, especially for such sites as lung (including trachea and bronchi) (Fig. 2, Table 4), with a mean annual increase of up to 7.0/100 000 in the age group 70 and older, and rectum, with a mean annual increase of 2.4/100 000 in the age group 70 and older. During the last 10 years, morbidity from rectal cancer has increased by 81% in the age group 60-69 years (from 24.2/100 000 to 43.9/100 000) and by 70% in the age group 70 years and older (from 34.5/100 000 to 58.5/100 000). Due to a decline in morbidity levels in almost all age groups from cancers of the lower lip, oesophagus and stomach, the rise in overall cancer morbidity has not been as pronounced: the mean annual increase in the age group 50-59 years was 0.2%, that in the age group 60-69 years, 1.2% and that for 70 years and older, 1.1%.