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Cancer Incidence in the Commonwealth of Independent States, the Baltic States and Georgia—The Former U.S.S.R.

David G. Zaridze and Tamara Basieva

INTRODUCTION

LITTLE DETAILED information has been available about cancer patterns in the former Union of Soviet Socialist Republics (U.S.S.R.) for a variety of reasons [1, 2]. However, there has been an attempt to present broad cancer patterns in republics which comprised this territory [3]. This publication covered the period between 1969 and 1971 and included only nine diagnostic categories in men and 11 in women by six age groups, reflecting the layout of the data collection form for cancer incidence statistics used in the U.S.S.R. until 1989. The list of cancer sites was far from being complete and excluded, for example, cancer of the colon, liver, pancreas, corpus uteri, prostate, while the category of skin cancer included both malignant melanoma and other skin neoplasms. Recently, mortality data and the corresponding population information have become available [4]. Changes in the former U.S.S.R. from the mid-1980s have resulted in the increased availability of cancer incidence and population information.

The territory of the former U.S.S.R. is vast and the differences in lifestyles and environmental exposures between the republics are also large. Accordingly, it is of great interest to know the underlying cancer patterns and how these relate to the different exposure patterns.

Cancer diagnosis and treatment services in the former U.S.S.R. have been centralised and this has enabled a central register to be maintained in the republics regarding all cases of cancer diagnosed and treated in these territories. Registration of all patients with newly diagnosed cancer, including cancers diagnosed at the time of death or at autopsy in the former U.S.S.R. was the responsibility of oncological dispenseries (hospitals) which served defined catchment areas. They collected information about cancer patients and presented annual statistical reports at the level of the oblast and republic.

Cancer registration in the former U.S.S.R. had many shortcomings including non-systematic and low-level control over data quality [1]. The use of indices of reliability provides some insight into data quality, suggesting that there are some regional differences in quality of diagnosis and registration. For example, the proportion of morphologically (histologically or

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cytologically) confirmed cases of lung cancer in 1987 varied from 25% in Tadjikistan to 69% in Estonia, stomach cancer from 48% in Ukraine and Takjikistan to 79% in Estonia, breast cancer from 88% in Tadjikistan to 98% in Lithuania, and cervical cancer from 92% in Tadjikistan to 100% in Moldavia. Microscopic confirmation for all cancer was higher in Trancaucasia (74.8–80.7%) and the Baltic Republics (73.0–79.6%) and lower in Kazakhstan and Central Asia (62.4–69.4%). The range for microscopic confirmation of cancer among incident cases in 1989 for republics was 39–79% for cancer of the oesophagus; 44–78% for stomach cancer; 50–77% for colon cancer; 66–98% for rectal cancer; 27–66% for lung cancer; 89–100% for skin melanoma; 77–98% for breast cancer; 85–99% for cancer of the cervix uteri; 79–99% for cancer of the corpus uteri; 53–90% for ovarian cancer; 25–80% for prostate cancer; 46–88% for bladder cancer; 65–100% for lymphatic tissue cancer and 62–81% for cancer all sites combined.

Other indices of reliability of registration were also not very satisfactory [1]. However, the existing statistical information enables an estimate to be made of cancer incidence in the republics. This estimate differs from cancer incidence as measured in many western cancer registries where more checks are available to enable a more defined pattern of cancer incidence to be obtained, e.g. in the former U.S.S.R. non-histologically verified cases who have not received radical treatment are more likely to be missed and the use of death certificate only registrations is also lower. However, the data presented here provide more than minimal incidence rates and the comparison between republics is unlikely to be greatly distorted.

MATERIALS AND METHODS

Since 1989, cancer incidence statistics in the former U.S.S.R. have covered 36 diagnostic categories in males and 38 in females, corresponding to the rubrics of the Ninth Revision of the International Classification of Diseases [6]. The annual incidence statistics for these sites are available for 15 republics and also for the smaller administrative units (oblast) by sex and age and 5-year age intervals, and including 16 age-groups.

Numbers of newly diagnosed cases of cancer for the year 1989 were provided by the Department of Statistics of the Ministry of Public Health of the former U.S.S.R. The denominators of rates are based on the population census carried out in 1989. Annual rates per 100 000 person-years for all ages were standardised by the direct method, using the World Standard Population [7].

The number of newly diagnosed cases of cancers of (a) the trachea, bronchus and lung (lung cancer), (b) stomach, (c) breast and (d) cervix uteri for a 17-year period (1971–1987) in six selected republics (Byelorussia, Georgia, Lithuania, Moldavia, Latvia and Estonia) by 10-year age-groups were also provided by the Department of Statistics of the Ministry of Public Health of the former U.S.S.R. The denominators of rates are based on population censuses and, for inter-censal years, on the mid-year population estimates provided by the same department.

Incidence trends were calculated using exponential regression analysis. The average annual percentage change was calculated and the hypothesis testing no change was based on this and its standard error.

Unless otherwise specified, all rates reported are expressed as rates per 100 000 person-years adjusted to the World Standard Population [7].

In this paper we report the incidence of cancers for 15 republics. We also present the results of the time-trend analysis for the period of 1971–1987 for cancers of lung, stomach, breast and cervix uteri in six republics: Byelorussia, Georgia, Lithuania, Moldavia, Latvia and Estonia.

CANCER INCIDENCE BY SITE

In 1989 in the former U.S.S.R. there were 676 537 newly diagnosed cases of cancer recorded (609 022 excluding non-melanoma skin cancer), while the number of deaths from cancer totalled 470 158.

In men the highest incidence rates were observed for lung cancer (71.7 per 100 000 person-years) which represents 29.6% of total cancer incidence in males. The second highest rate was reported for stomach cancer (41.6 per 100 000 person-years or 17.2% of total cancer incidence), followed by cancers of the mouth and pharynx (15.7 per 100 000 person-years or 6.5%), rectum (10.4 per 100 000 person-years or 4.3%), colon (10.0 per 100 000 person-years or 4.1%), bladder (9.8 per 100 000 person-years or 4.1%), larynx (9.6 per 100 000 person-years or 4.0%), oesophagus (9.4 per 100 000 person-years or 3.9%), prostate (8.8 per 100 000 person-years or 3.6%) and pancreas (8.1 per 100 000 person-years or 3.3%) (Fig. 1).

In women the highest rates are reported for breast cancer (28.3 per 100 000 person-years) which represents 19.7% of total cancer incidence rates in women, followed by stomach cancer (17.8 per 100 000 person-years or 12.4%), and cervix uteri (12.6 per 100 000 person-years or 8.8%), followed by cancers of the

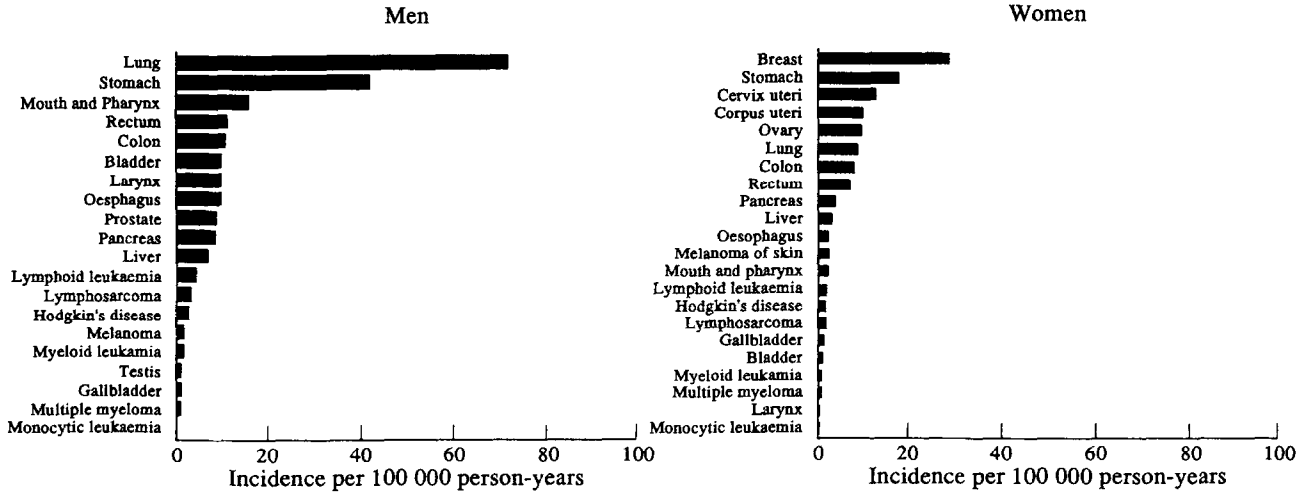

Fig. 1. Average, all-ages age-standardised incidence rates of cancer in men and women in the territory of the former U.S.S.R.

corpus uteri (9.7 per 100 000 person-years or 6.8%), ovary (9.3 per 100 000 person-years or 6.5%), lung (8.4 per 100 000 person-years or 5.9%), colon (8.0 per 100 000 person-years or 5.6%), rectum (7.3 per 100 000 person-years or 5.1%), pancreas (4.0 per 100 000 person-years or 2.8%) and liver (2.8 per 100 000 person-years or 2.0%) (Fig. 1).

REGIONAL VARIATIONS

All sites (excluding non-melanoma skin cancer)

Age-standardised rates for malignant neoplasms excluding non-melanoma skin cancer for the U.S.S.R. as a whole in 1989 were 242.1 in men and 143.7 in women. These rates are lower than the estimated incidence rates for the European Community (EC), for approximately the same period, which were 308.8 in men and 214.4 in women (Table 1) [8].

The highest incidence rates of cancer of all sites in men were observed in Estonia (273.3), Kazakhstan (263.2) and Russia (260.0), with the lowest rates found in Uzbekistan (133.8), Tadjikistan (123.8) and Georgia (115.7). In women, the highest cancer rates for all sites are registered in Estonia (180.0), Kazakhstan (150.2) and Lithuania (150.0), with the lowest rates found in Uzbekistan (103.7), Tadjikistan (97.7) and Georgia (89.1).

The incidence rates for all cancers except non-melanoma skin cancer in Estonia, Kazakhstan and Russia in men are comparable with the estimated incidence rates in some countries of the EC, such as the U.K. (296.0), Denmark (262.6) and Spain (263.1). All these rates are higher than the rates found in Georgia (115.7) which are much lower than in any EC country, where the rates vary from being highest in France (358.1) to lowest in Greece (232.0) (Table 1) [8].

The incidence rates for all cancers in women observed in the former U.S.S.R. are in general lower than in the EC countries where these rates range between 246.7 (U.K.) and 174.8 (Greece) (Table 1) [8].

Mouth and pharynx (ICD9 140, 141, 143–145, 146, 148)

We considered cancer of the mouth and pharynx (except nasopharynx) together because of the relatively small number of cancers of individual sites in all reported areas of the U.S.S.R. There were 25 868 newly diagnosed cases of cancer of the mouth and pharynx in the U.S.S.R. in 1989. This number represents 4.2% of all newly diagnosed cancer cases in this year. Age-standardised rates for all ages per 100 000 person-years for these sites are 15.7 in men and 2.1 in women. These rates are slightly higher than the estimated rates for these sites in the EC (13.7 in men; 1.9 in women) (Table 1) [8].

The incidence of cancer of the mouth and pharynx in men varies between republics of the former Soviet Union. The highest age-standardised incidence rates for all ages per 100 000 person-years are observed in Moldavia (18.6), Ukraine (17.3) and Russia (17.0), and the lowest in Tadjikistan (6.8), Armenia (6.4) and Georgia (6.2) (Fig. 2).

The pattern in women is different and the range of variation smaller than that among men. Highest incidence rates in women are reported from Uzbekistan (3.2), Turkmenistan (3.0) and Tadjikistan (2.9) with the lowest rates reported from Georgia (1.3), Estonia (1.1) and Latvia (0.6) (Fig. 2).

In the EC countries the highest incidence rates of cancer of the mouth and pharynx are seen in France (33.9 in men; 3.9 in women), Luxemburg (22.6 in men; 2.3 in women), Italy (13.9 in men; 2.3 in women) and the lowest are seen in the U.K. (6.4 in men; 0.4 in women) and Greece (4.8 in men; 0.6 in women) [8].

Alcohol drinking and tobacco smoking or the use of smokeless tobacco are risk factors of cancer of the mouth and pharynx

Table 1. The comparison of overall incidence rates for cancer in former U.S.S.R. and EC

Site	U.S.S.R. overall rate		EC overall rate	
	Male	Female	Male	Female
Mouth and pharynx	15.7	2.1	13.7	1.9
Oesophagus	9.4	2.7	5.7	1.3
Stomach	41.6	17.8	25.1	11.1
Colon	10.0	8.0	19.2	15.8
Rectum	10.4	7.3	10.9	6.6
Liver	6.6	2.8	14.3	8.5
Gallbladder	1.1	1.3	1.5	2.5
Pancreas	8.1	4.0	7.5	4.4
Larynx	9.6	0.4	12.3	0.5
Trachea, bronchus and lung	71.7	8.4	64.0	8.2
Melanoma of skin	1.9	2.3	3.6	4.9
Breast		28.3		56.8
Cervix uteri		12.6		10.4
Corpus uteri		9.7		9.7
Ovary		9.3		11.0
Prostate	8.8		35.2	
Testis	1.2		3.9	
Bladder	9.8	1.3	19.2	3.5
Other urinary tract	5.1	2.5	8.0	3.8
Non-Hodgkin lymphoma	3.0	1.7	5.4	3.1
Hodgkin's disease	2.6	1.8	2.2	2.2
Multiple myeloma	0.9	0.7	2.1	1.2
All sites (excluding non-melanoma skin cancer)	242.08	143.69	308.8	214.4

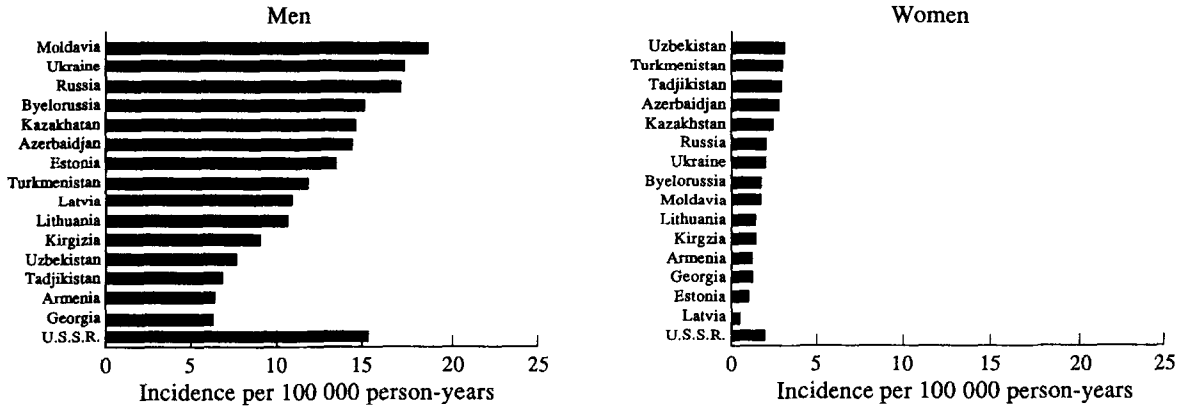

Fig. 2. Average, all-ages age-standardised incidence rates of cancer of the oral cavity and pharynx in men and women in the 15 republics of the former U.S.S.R.

[9–11]. High rates of cancer of these sites in men in Moldavia, Ukraine, Russia and Belorussia are associated with high consumption of alcohol and smoking, while relatively high rates in women in Uzbekistan, Turkmenistan and Tadjikistan are most probably associated with use of smokeless tobacco [12].

Oesophagus (ICD9 150)

There were 18 723 newly diagnosed cases of oesophageal cancer in the U.S.S.R. in 1989. This represents 3.1% of all newly diagnosed cancer cases in this year. Age-standardised incidence rates for oesophageal cancer for the former Soviet Union are 9.4 in men and 2.7 in women. These rates are approximately double the estimated incidence rates for the EC (5.7 in men; 1.3 in women) (Table 1) [8].

There is an important geographical variation in the incidence of oesophageal cancer in the U.S.S.R. The highest age-standardised incidence rates are observed in Turkmenistan (43.6 in men; 32.0 in women), Kazakhstan (25.2 in men; 14.1 in women) and Uzbekistan (22.8 in men; 13.8 in women). The rates in the European part of the U.S.S.R. are lower. The lowest rates are reported from Georgia (1.6 in men; 0.5 in women) and in Armenia (3.3 in men; 1.8 in women) (Fig. 3).

In some regions of Central Asia the incidence of oesophageal cancer is exceptionally high. For example, in the Muinak region of Karakalpakstan the rates are 126.0 in men and 150.0 in women [13]. These rates are comparable with the previously highest reported rates from Iran and China [14]. The incidence of oesophageal cancer is currently high in blacks in Connecticut (U.S.A.) (24.0 in men; 6.0 in women), in Calvados (France) (29.9 in men; 1.2 in women) and in Israel among Jews born in Africa and Asia (35.8 in men; 1.6 in women) [7].

The estimated rates of oesophageal cancer in the EC countries vary in men from being highest in France (11.5) to lowest in Denmark (2.9) (Table 1) [8].

The dominant risk factors for oesophageal cancer in Europe and Northern America are alcohol and tobacco [10, 11] and the high incidence of oesophageal cancer in France and the black population of the U.S.A. is associated with the combined effects of smoking and high consumption of alcohol. However, the aetiology of oesophageal cancer in populations with exceptionally high incidence is unknown, although the possible role of vitamin deficiency has been implicated [12–14]. The drinking of hot tea, use of opium, consumption of pickled vegetables and mouldy food, some of which have been shown to be mutagenic, and the ingestion of foods with high levels of carcinogenic nitrosoamines and endogenous formation of nitrosoamines, have also been implicated as causes, but of lesser importance than smoking and alcohol consumption [14, 15].

Stomach (ICD9 151)

In 1989, 94 363 newly diagnosed cases of stomach cancer were registered in the U.S.S.R. This represents 15.5% of all newly diagnosed cancer cases in this year.

Age-standardised incidence rates for stomach cancer in the

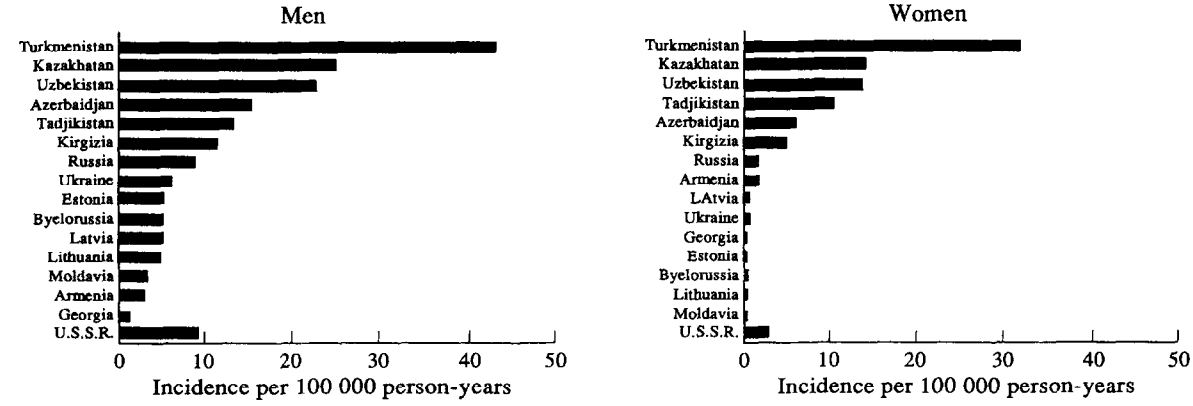

Fig. 3. Average, all-ages age-standardised incidence rates of cancer of the oesophagus in men and women in the 15 republics of the former U.S.S.R.

former U.S.S.R. are 41.6 in men and 17.8 in women. The rates in men are approximately double the estimated incidence of stomach cancer in the EC (25.1 in men; 11.1 in women) (Table 1) [8]. There is a very striking range in gastric cancer incidence rates between highest and lowest stomach cancer incidence rates in the republics of the former U.S.S.R. The highest age-standardised incidence rates are observed in Russia (47.0 in men; 20.3 in women) and in Byelorussia (45.2 in men; 19.6 in women). The lowest incidence rates are reported from Georgia (14.9 in men; 7.1 in women) (Fig. 4).

Incidence rates of stomach cancer in the U.S.S.R. are among the highest recorded worldwide. However, the highest rates observed in Russia (47.2 in men; 20.3 in women) and Byelorussia (45.2 in men; 19.6 in women) are lower than in all Japanese registries (where stomach cancer incidence in men ranges between 76.9 and 82.0), San Paolo (Brazil) (53.6) and Costa Rica (58.9). Most other incidence rates reported worldwide are lower than those high rates observed in the U.S.S.R. It should be noted, however, that stomach cancer incidence is also high in Nowy Sacs (Poland) (43.7 in men; 17.0 in women) and in Parma (Italy) (44.0 in men; 19.9 in women) [7].

The estimated incidence rates of stomach cancer in the EC countries in men range from being highest in Portugal (40.3) and Italy (33.0) to lowest in Denmark (14.2) and Greece (15.1) [8].

The aetiology of stomach cancer is almost certainly related to diet although the precise components are largely unknown. The most consistent finding from analytical epidemiological studies of stomach cancer is the protective effect of fruits and vegetables, or foods rich in vitamins [16]. High salt intake has been suggested as a risk factor of stomach cancer [17]. The endogenous formation of carcinogenic nitrosoamines from nitrates and nitrites consumed with food has been proposed as a candidate factor in causation of stomach cancer, but this hypothesis has not been rigourously proved [17]. A number of studies have shown an association between infection with *Helicobacter pylori* and stomach cancer [18].

The observed important decrease in the incidence of stomach cancer in Western countries and elsewhere in the world has been postulated as being related to improvements in food preservation and refrigeration practices.

Colon (ICD9 153) and rectum (ICD9 154)

The descriptive epidemiologies of these two sites are presented separately: however, they should be considered together due to the difficulties of distinguishing one from the other in the rectosigmoid area [19].

The annual number of newly diagnosed cases of colon cancer in the U.S.S.R. in 1989 was 30 873 or 5.1% of all newly diagnosed cancer cases. Age-standardised incidence rates for colon cancer in the U.S.S.R. in men are 10.0 and 8.0 in women. The estimated rates for colon cancer in the EC are higher than in the U.S.S.R. (19.2 in men; 15.8 in women) (Table 1) [8].

The incidence of colon cancer in the former U.S.S.R. varies from the highest rates in Estonia (12.8 in men; 11.2 in women), Russia (11.1 in men; 9.0 in women) and Ukraine (10.8 in men; 8.1 in women) to the lowest rates in Turkmenistan (2.8 in men; 2.5 in women), Uzbekistan (3.5 in men; 2.8 in women) and Georgia (3.6 in men; 2.6 in women).

The highest rates of colon cancer are reported from Connecticut (U.S.A.) (34.1 in men; 26.1 in women) and Hawaii among Japanese (34.1 in men; 22.0 in women). In comparison with these rates and also with generally high incidence observed in North America, Western Europe and Australia the highest rates in the U.S.S.R. could be considered as intermediate, but they are comparable with incidence of colon cancer in the registries in Central and Eastern Europe and also in some countries of the EC, such as Greece (7.8 in men; 7.7 in women), Spain (9.0 in men; 7.5 in women) and Portugal (12.4 in men; 10.4 in women) [7].

Very low rates of colon cancer reported from the Central Asian Republics are of the same order as the lowest rates in India and China [7].

In 1989 there were 29 202 cases of rectal cancer. This represents 4.8% of all newly diagnosed cancer cases in the country. Age-standardised rates for rectal cancer for the U.S.S.R. are 10.4 in males and 7.3 in females. Incidence of rectal cancer is very similar in the EC (10.9 in men; 6.6 in women) (Table 1) [8].

High incidence rates for rectal cancer are reported from the European part of the territory: Estonia (12.8 in men; 6.4 in women), Ukraine (11.7 in men; 7.9 in women), Byelorussia (11.5 in men; 7.2 in women) and Lithuania (11.5 in men; 6.8 in women); very low rates are observed in Central Asian Republics, i.e. Turkmenistan (3.4 in men; 2.9 in women) and Uzbekistan (4.3 in men; 3.2 in women), and also in Georgia (4.7 in men; 2.4 in women) and Armenia (5.7 in men; 4.6 in women).

Worldwide comparisons suggest that the high rates of cancer of the rectum in males in the former U.S.S.R., ranging from 11.0 to 12.0 observed in Estonia, Ukraine, Byelorussia and

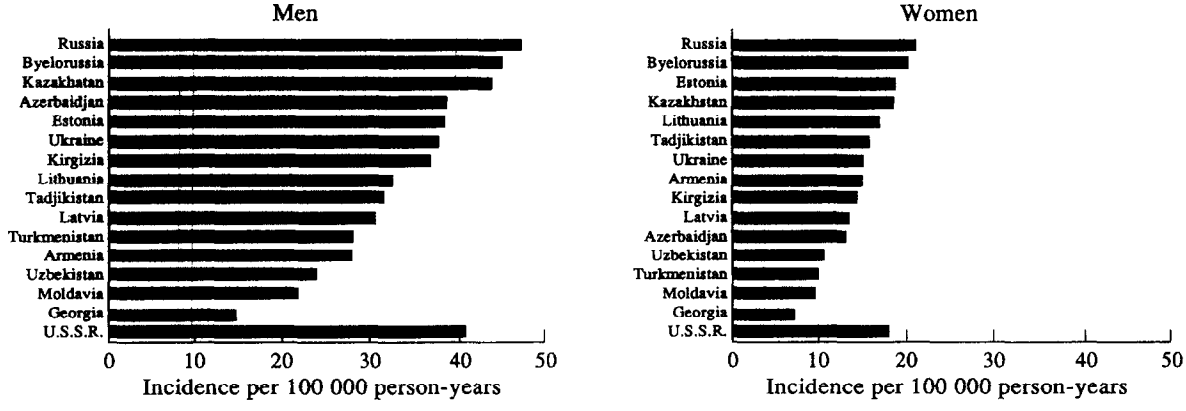

Fig. 4. Average, all-ages age-standardised incidence rates of cancer of the stomach in men and women in the 15 republics of the former U.S.S.R.

Lithuania are similar to incidence rates in most countries of Western, Southern and Central Europe [7, 8]. The lowest rates reported in Turkmenistan, Uzbekistan and Tadjikistan are comparable with rates observed in India, Kuwait, Colombia, Brazil and Costa Rica [7].

It should be noted that the sex ratio of colon cancer in European countries is fairly close to unity, while rectum cancer shows a clear excess of cases among men (Table 1) [8]. A similar pattern is observed in other countries of the world. In most of the republics reported here the sex ratio of colon cancer in all but one republic varies between 1.0 and 1.4 while the sex ratio for rectal cancer is 1.5 and higher only in five republics. For example, in Latvia the sex ratio of colon cancer is 1.6 and of rectal cancer 1.2, suggesting that the incidence of rectum cancer may have been understimated. It has been postulated that differences in definition of the rectum, localisation of the tumours and the use of the term rectosigmoid may thus all influence the estimates of tumours of the colon and rectum [19].

Diet is suspected to have a considerable influence on colorectal cancer risk [20]. The results of several studies indicate that high intakes of saturated fat and meat increase risk of cancer of the large intestine. A high intake of fruit and vegetables or foods rich in fibre and vitamins has been associated with protection against cancer of these sites [21].

Evidence on the presence of an increased risk conferred by drinking alcohol is not conclusive although such an effect has been observed in some studies, notably for high beer consumption and especially for rectal cancer [11].

Liver (*ICD*9 155)

In 1989 the annual number of newly diagnosed cases of cancer of the liver was 14 763 or 2.4% of all incidence cases of cancer in the country.

The incidence of liver cancer in the U.S.S.R. as a whole was found to be 6.6 in men and 2.8 in women, thus lower than in the EC (14.3 in men; 8.5 in women) (Table 1) [8]. The highest age-standardised incidence rates of liver cancer were observed in Kazakhstan (13.6 in men; 5.6 in women), Kirgizia (12.2 in men; 5.0 in women) and Azerbaidjan (11.7 in men; 7.8 in women), with the lowest incidence rates reported from Byelorussia (3.8 in men; 1.9 in women), Latvia (3.6 in men; 1.8 in women) and Lithuania (3.2 in men; 1.8 in women).

The highest incidence of liver cancer reported internationally is observed in China, Shanghai (34.4 in men; 11.6 in women), Tianjin (23.1 in men; 9.0 in women), among Chinese in Singapore (31.6 in men; 7.2 in women) and Hong Kong (32.3 in men; 7.4 in women). High rates are also seen in Chinese migrants to the U.S.A. [7].

In Europe the highest rates of liver cancer are reported from Greece (35.1 in men; 18.3 in women), Italy (27.5 in men; 19.9 in women) and France (20.1 in men; 6.2 in women). Rates in other parts of Europe are low, similar to the incidence in the European part of the U.S.S.R. [8].

A high level of alcohol consumption is a risk factor for liver cancer [11], but the pattern of liver cancer incidence in the U.S.S.R. is different from that of the other alcohol-related cancers, such as cancer of the mouth and pharynx. High incidence of liver cancer may also be associated with chronic hepatitis B infection [22].

Difficulties in the differential diagnosis between primary and secondary liver nodules may influence liver cancer incidence in both directions by inflating and/or understimating incidence and mortality rates.

Gallbladder (*ICD*9 156)

In 1989 there were 4483 newly diagnosed cases of cancer of the gallbladder or 0.7% of all newly diagnosed cases of cancer. In the U.S.S.R. as a whole the incidence of gallbladder cancer in men is 1.1 and in women is 1.3. The rates in men are very similar to the estimated rates in the EC in men (1.5), while rates in women in the EC are higher (2.5) (Table 1) [8].

The highest incidence of gallbladder cancer is observed in Azerbaidjan (2.9 in men; 3.0 in women), followed by Lithuania (1.9 in men; 1.5 in women). The lowest rates are reported from Turkmenistan (0.2 in men; 0.4 in women) and Georgia (0.4 in men; 0.6 in women). In practically all areas, incidence is higher in women than in men. Similar patterns are observed in other areas, namely European countries.

The rates observed in Azerbaidjan in women are comparable with the highest rates in the EC countries [8]. For example, the highest estimated rates of gallbladder cancer in the EC countries are observed in Germany (2.3 in men; 4.8 in women) and the Netherlands (2.4 in men; 3.7 in women). Worldwide, the highest rates are reported from the U.S.A., New Mexico in American Indians (10.8 in men; 13.2 in women) and from Israel among Jews born in Africa and Asia (2.3 in men; 23.6 in women) [7].

The aetiology of bladder cancer is largely unkown although the role of gallstones is of considerable significance. It has been shown that obesity, especially in women, is associated with high risk of gallbladder cancer [23].

Pancreas (*ICD*9 157)

In 1989 the annual number of newly diagnosed cases of cancer of the pancreas in the U.S.S.R. was 19 959 or 3.3% of all incidence cases of cancer in the country.

The incidence of pancreatic cancer in the U.S.S.R. as a whole in 1989 was 8.1 for men and 4.0 for women, which is similar to the estimated incidence in the EC (7.5 in men; 4.4 in women) (Table 1) [8].

The highest incidence rates of pancreatic cancer are observed in Latvia (12.6 in men; 5.3 in women), Estonia (10.7 in men; 6.2 in women) and Lithuania (9.7 in men; 4.1 in women). Low rates are reported from Central Asia: Takjikistan (2.9 in men; 2.2 in women), Uzbekistan (2.9 in men; 2.1 in women).

The highest male pancreatic cancer rates in the U.S.S.R. (Latvia 12.6; Estonia 10.7; Ukraine 9.8) are, in general, higher than most rates reported worldwide [7], with the exception of very high rates in U.S.A. blacks in Alameda (16.7), Bay Area (15.5), and also in Korean ethnics in Los Angeles (16.4). It should be noted that highest incidence of pancreatic cancer in males is registered in Israel among Jews born in Europe and America (22.6). Low and intermediate rates of cancer of the pancreas are similar to those in Europe [8].

The diagnosis of cancer of the pancreas is difficult and this may affect the validity of incidence statistics. Cigarette smoking is an established risk factor for cancer of the pancreas and dietary factors may also play a role [23, 24].

Larynx (*ICD*9 161)

There were 13 483 incidence cases of laryngeal cancer in the U.S.S.R. in 1989 or 2.2% of all newly diagnosed cases of cancer. The incidence rate of laryngeal cancer in the former U.S.S.R. as a whole is 9.6 for men and 0.4 for women; rates in men are slightly lower than in the EC (12.3) (Table 1) [8].

The highest rates of laryngeal cancer in men are observed in Armenia (11.2), Russia (10.3), Ukraine (9.9), Byelorussia (9.6), Estonia (9.6) and Georgia (9.5). Low rates are reported from the

Central Asian Republics of Tadjikistan (2.2), Uzbekistan (4.4) and Kirgizia (5.0). Geographical variation in the incidence of laryngeal cancer in women is small.

High incidence rates of laryngeal cancer in the U.S.S.R. are comparable with those internationally. The highest rates among the cancer registries [7] are observed in San Paolo (Brazil) (17.8), Navarra (Spain) (17.2), Varese (Italy) (16.2), Zaragoza (Spain) (15.5), Porto Alegre (Brazil) (14.3), the urban population of Doubs (France) (14.0) and Parma (Italy) (12.3). In North America high rates are also in Quebec (Canada) (10.4) and among black population groups in the U.S.A.: Connecticut (12.6) and Atlanta (11.5). High rates of laryngeal cancer are reported from India, Bombay (10.0), Nagpur (11.8) and Poona (12.9).

The predominant risk factors for laryngeal cancer are tobacco smoking [10] and alcohol consumption [11]. The joint effect of these two factors is often found to be multiplicative [10, 11].

Trachea, bronchus and lung ("lung cancer") (ICD9 162)

The annual number of newly diagnosed lung cancer cases in 1989 was 112 373 or 17% of all cancer registered in this year. Age-standardised incidence rates for lung cancer for the U.S.S.R. as a whole in males are 71.7 and in females 8.4: they are higher than in the EC (64.0 in men; 8.2 in women) (Table 1) [8].

The incidence of lung cancer in men varies between republics while there is a little variation in female lung cancer incidence rates. The highest age-standardised incidence rates are observed in Russia (80.9 in men; 8.7 in women), Estonia (76.5 in men; 9.5 in women), Kazakhstan (75.7 in men; 10.6 in women) and Ukraine (73.9 in men; 9.2 in women). The lowest incidence rates are reported from Takjikistan (23.8 in men; 6.9 in women), Turkmenistan (23.7 in men; 4.1 in women) and Uzbekistan (23.8 in men; 5.4 in women) (Fig. 5).

Regional lung cancer rates in males in the U.S.S.R. are among the highest recorded worldwide. Higher rates are observed in black males in the U.S.A. in New Orleans (110.0), Detroit (102.3), Alameda (102.2) and the Bay Area (101.2), and also among Maoris in New Zealand (102.2) and in the U.K., particularly in the west of Scotland (100.4) [7].

Among EC countries, only in three countries are estimated male lung cancer rates higher than in Russia: Belgium (91.8), the Netherlands (89.2) and the U. K. (82.1) [8].

Lung cancer rates in women in the former U.S.S.R. are not very high, a very similar situation to that in most other countries. The highest rates in women among the 15 republics are reported from Kazakhstan (10.0), Estonia (9.5) and Ukraine (9.2). These rates are lower than the high rates observed in North America and the United Kingdom but are comparable with most European rates for females [7, 8].

The aetiology of lung cancer is well known and cigarette smoking is the most important risk factor. About 85% of all cases of lung cancer among men are attributable to cigarette smoking in most high incidence countries. The proportion of lung cancer cases in women that can be attributed to smoking is generally considered to be lower [10].

Melanoma of the skin (ICD9 172)

The annual number of newly diagnosed cases of melanoma of the skin in the former U.S.S.R. in 1989 was 2319 or 0.4% of all newly diagnosed cancers. Incidence of skin melanoma of the former U.S.S.R. is 1.9 in men and 2.3 in women. These figures are somewhat lower than in the EC (3.6 in men; 4.9 in women) (Table 1) [8].

The highest incidence rate was observed in Estonia (3.7 in men; 4.1 in women) and the lowest incidence in Central Asian Republics of Kirgizia (0.9 in men; 1.4 in women), Turkmenistan (0.9 in men; 0.7 in women) and Tadjikistan (0.8 in men; 1.3 in women).

In general, in comparison with high rates internationally the incidence of melanoma in the U.S.S.R. is low. Very high rates are observed in Australia (Queensland: 30.9 in men; 28.5 in women) and also among white population groups in North America such as in Atlanta (12.3 in men; 10.3 in women). In North America and Australia the incidence of melanoma increases with proximity to the equator [7]. The opposite pattern is seen in Europe, where incidence of skin melanoma is five to six times higher in Denmark (6.2 in men; 8.9 in women) than in Portugal (0.9 in men; 1.2 in women) and Spain (1.2 in men; 1.7 in women) [8].

It should be noted that in the former U.S.S.R. there is a clear north–south gradient in the incidence of melanoma: highest rates are seen in populations with fair skin, living in the north west of the country and the lowest rates in the South and particularly among population of Central Asia. It is known that the risk of skin melanoma is dominated by constitutional factors such as skin and eye colour and intermitent exposure to sunlight. Higher risk is associated with fair complexion and with a tendency to develop freckles easily [25, 26].

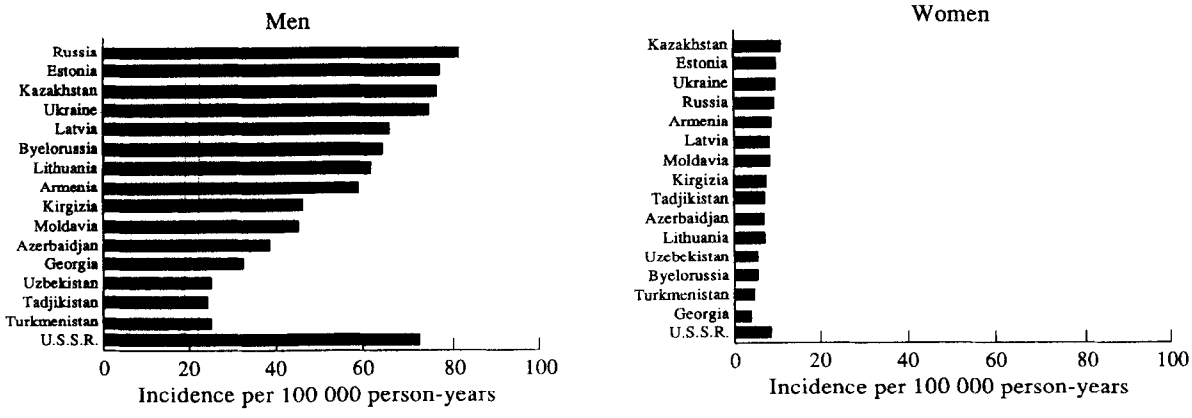

Fig. 5. Average, all-ages age-standardised incidence rates of cancer of the trachea, bronchus and lung in men and women in the 15 republics of the former U.S.S.R.

Breast (ICD9 174)

The annual number of newly diagnosed cases of breast cancer in 1989 was 53 082 or 8.7% of all incident cases of cancer in this year. The incidence rate of breast cancer in the U.S.S.R. is 28.3, which is much lower than in the EC (56.8) (Table 1) [8].

The highest age-standardised incidence rates of breast cancer are observed in Estonia (39.8), Armenia (36.4), Lithuania (31.0) and Ukraine (30.7). The lowest rates are reported from Tadjikistan (13.5) and Turkmenistan (14.0) (Fig. 6).

In general, in comparison with the highest rates recorded worldwide [Hawaii: Hawaiian (93.9) and whites (84.4) and Connecticut (77.8)], breast cancer rates in the former U.S.S.R. are not very high. They are also lower than the highest Western European rates [Switzerland, Geneva (72.2); U.K., Birmingham (55.0); Germany, Hamburg (58.0); France, Calvados (55.1) and Italy, Varese (59.6)]. The rates in most areas of the European part of the former U.S.S.R. are very similar to those in Eastern and Central Europe [Poland, Warsaw City (32.4); Romania, County Cluj (30.4); Hungary, Szaboles (22.9)] [2] and also in some countries of the EC (Spain: 38.6; Greece: 43.8) [7, 8].

The lowest rates in the former U.S.S.R., especially in the Central Asian Republics are among the lowest in the world. The lowest rates internationally are reported from registries in Kuwait among Kuwaitis (15.9), in Israel among non-Jews (14.0), China, Tianjin (18.2), Shanghai (19.1) and India, Nagpur (19.2) [6], while in the former U.S.S.R. the lowest reported rates are 13.5 (Tadjikistan) and 14.0 (Turkmenistan).

In recent years there has been considerable interest in the role of diet in breast cancer aetiology. International ecological studies have found high breast cancer incidence and mortality to be associated with high national food disappearance of fat. However, the results of the analytical epidemiological studies are not consistent. Some studies have found an increasing risk with consumption of high-fat foods and high total fat consumption or with high saturated fat intake [21, 27], while a few other studies have observed an inverse association between high fat intake or high polyunsaturated fat intake and the risk of breast cancer [28, 29]. High intake of alcohol has been found to increase the risk of cancer of the breast [29, 30].

The established risk factors of breast cancer are certain factors related to reproductive history, such as late age at first birth, early menarche and late menopause [27, 29].

Cervix uteri (ICD9 180)

The annual number of newly diagnosed cases of cervical cancer in 1989 was 24 161 of 4.0% of all incidence cases of cancer. The incidence rate of cervical cancer for the U.S.S.R. as a whole is 12.6; this figure is somewhat higher than in the EC (10.4) (Table 1) [8].

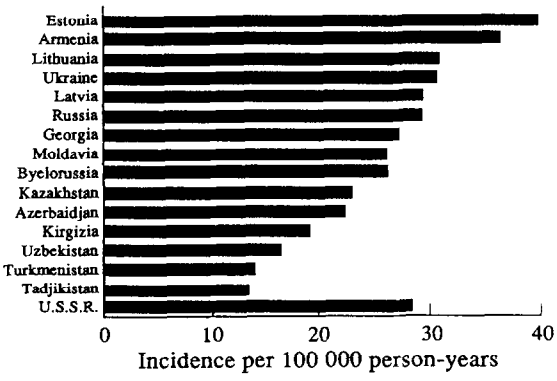

Fig. 6. Average, all-ages age-standardised incidence rates of cancer of the breast in women in the 15 republics of the former U.S.S.R.

The incidence rate of cervical cancer varies from 17.3 in Moldavia to 9.3 in Tadjikistan. High rates are also observed in Estonia (15.8) and Kazakchstan (14.4).

International comparison suggests that incidence of cervical cancer in the U.S.S.R. is much lower than in areas with high incidence of this cancer, such as Recife, Brazil (83.2), Cali, Colombia (48.2) and Madras, India (46.1). The incidence rates of cervical cancer are comparable with those in U.S.A., Canada and Europe, although in the U.S.A. cervical cancer rates are higher in blacks and Latinos (Los Angeles, Latinos 18.5; Detroit, blacks 19.0). In Europe rates are high in the former German Democratic Republic (24.6), Hamburg, Federal Republic of Germany (20.2), Cracow, Poland (20.2) and Denmark (19.0) [7].

The major cause of cancer of the cervix is likely to be a sexually transmitted agent, perhaps certain types of human papillomavirus [31]. Mass screening for cervical precancerous lesions and cancer leads to the decrease in incidence and consequently, mortality of cancer of the cervix [32].

Corpus uteri (ICD9 182)

The annual number of incidence cases of cancer of the corpus uteri in 1989 was 19 515 or 3.2% of all newly diagnosed cases of cancer in this year. Incidence of this cancer site for the former U.S.S.R. as a whole is 9.7, similar to the EC (9.7) (Table 1) [8].

The incidence of cancer of the corpus uteri varies from 13.6 in Latvia to 3.8 in Tadjikistan. High rates are observed in Estonia (12.6) and Ukraine (12.0).

Worldwide comparisons suggest that incidence of cancer of the corpus uteri in the U.S.S.R. is intermediate. Among cancer registries the highest incidence rates of uterine cancer are observed among Hawaiians in Hawaii (25.2), among whites in Hawaii (23.4), among blacks in the Bay Area (U.S.A.) (25.7), among whites in Los Angeles (24.1) and in Seattle (U.S.A.) (25.0) [7]. Rates in Europe are generally lower and are comparable with high rates in the former U.S.S.R.: Belgium (12.3), France (9.1), Germany (8.5) [7]. The lowest rates are observed in Asian registries: India (1.2–3.2), China (3.0–3.4), Japan (2.2–3.7), and these rates are very similar to those registered in Soviet Central Asian republics [7].

There is a strong association between risk of cancer of the corpus uteri and obesity, and dietary factors may also be important. Endogenous and exogenous hormones and especially oestrogens are undoubtedly involved in causation of uterine cancer [33].

Ovary (ICD9 183.0)

In 1989 in the U.S.S.R. there were 17 952 incidence cases of ovarian cancer or 2.9% of all newly diagnosed cancer cases. The incidence of ovarian cancer for the U.S.S.R. as a whole is 9.3. This figure is very close to the incidence of cancer of the ovary in the EC (11.0) (Table 1) [8].

The incidence of ovarian cancer varies from the high levels in Latvia (14.1), Lithuania (14.0) and Estonia (11.8) to the low rates in Central Asia: Tadjikistan (4.4), Uzbekistan (4.5) and Turkmenistan (5.2).

These high rates of ovarian cancer in the former U.S.S.R. are comparable with the highest rates worldwide [7], except those reported from Pacific Polynesian Islands (25.8). Among other registries highest rates are reported from Israel among Jews born

in Europe and America (15.2), Norway (15.3), Sweden (15.2). Rates in Northern America do not exceed 13.5 (Los Angeles, whites). The highest estimated incidence rates in the EC are in Germany (14.4) and the U.K. (15.5) [7].

Low incidence rates are observed in Asia, with rates in India, Japan and China similar to what has been reported from Asiatic populations in the former U.S.S.R. [7].

Tumours that arise in the ovary are histologically heterogenous and may well have different aetiologies. Use of combined oral contraceptives may well substantially reduce the risk of ovarian cancer [23].

Prostate (*ICD*9 185)

The annual number of incidence cases of cancer of the prostate in the U.S.S.R. in 1989 was 10 595 or 1.7% of all newly diagnosed cases of cancer. The incidence of prostate cancer for the former U.S.S.R. as a whole is 8.8, much lower than the estimated rate for the EC (35.2) (Table 1) [8].

The highest rates of prostate cancer are observed in Lithuania (17.3), Estonia (16.8) and Latvia (14.7), with the lowest rates observed in the Central Asian Republics: Turkmenistan (1.7), Tadjikistan (2.1) and Uzbekistan (2.5) (Fig. 7).

In comparison with international rates, the incidence rates of prostatice cancer in the U.S.S.R. are very low. Even the highest rates reported are five times lower than the highest rates observed worldwide, i.e. in American blacks [Alameda (87.8) and Detroit (91.1)] and three to four times lower than the rates in American whites [Atlanta (53.4) and Alameda (50.0)] and also considerably lower than the rates in most West European and Scandinavian registries: France (41.4); Germany (43.4); the Netherlands (36.0). Rates comparable with the highest incidence rates of prostatic cancer in the U.S.S.R. are observed in Southern, Central and Eastern European countries: Greece (15.8); Hungary, Vas (16.9); Poland, Cracow City (13.8) [7].

The incidence of prostate cancer in Asiatic registries such as Madras in India (3.1) and Shanghai in China (1.8) are similar to those in the Central Asian Republics of the former Soviet Union [7].

The causes of prostate cancer have been linked with sexual behaviour and dietary habits, such as high intake of fats and specifically saturated fats. However, none of these hypotheses have been proved [34].

Testis (*ICD*9 186)

There were 1585 cases of testicular cancer in the U.S.S.R. in 1989 or 0.3% of all incidence cases of cancer. Incidence of cancer of the testis in the U.S.S.R. is 1.2; this rate being lower than in the EC (3.9) (Table 1) [8]. The highest incidence is observed in Azerbaidjan (2.9) and in Georgia (2.3). In all other regions the rates vary between 0.9 in Turkmenistan and 1.8 in Kirgizia.

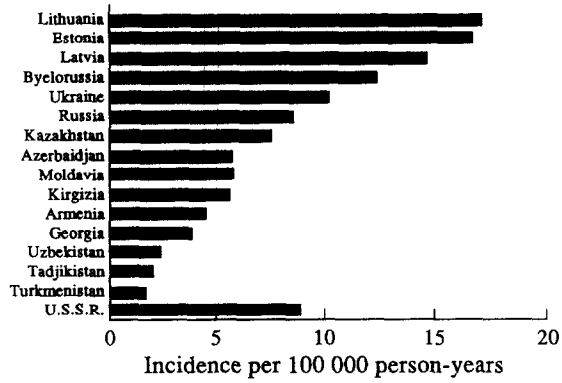

Fig. 7. Average, all-ages age-standardised incidence rates of cancer of the prostate in men in the 15 republics of the former U.S.S.R.

The highest incidence of cancer of the testis among cancer registries is observed in Switzerland, urban Geneva (9.9); Basel (8.3); Zurich (7.4); New Zealand, Maori (7.9) and Norway, urban (6.6). In North America and other parts of Western Europe incidence rates are lower and range from 1.5 to 5.0, Southern and Eastern Europe having lower rates. In Asia the rates are below 1 per 100 000 [7].

The highest estimated incidence rates for the EC countries are observed in Denmark (8.8) and Luxemburg (7.7), with the lowest rates in Portugal (1.7) and Spain (1.7) [8].

The aetiology of cancer of the testis is largely unknown and observed geographical differences worldwide as well as in the U.S.S.R. are difficult to explain within current understanding.

Bladder (*ICD*9 188)

There were 15 402 incidence cases of bladder cancer in 1989 in the U.S.S.R. or 2.5% of all incidence cases of cancer. The incidence of bladder cancer in the U.S.S.R. is 9.8 in men and 1.3 in women, lower than the estimated rates in the EC (19.2 in men; 3.5 in women) (Table 1) [8]. The highest incidence rates of bladder cancer in the U.S.S.R. are observed in Armenia (13.9 in men; 2.2 in women), Byelorussia (11.8 in men; 1.4 in women), Lithuania (11.4 in men; 1.7 in women), Estonia (11.3 in men; 3.1 in women) and Ukraine (11.3 in men; 1.3 in women). The lowest rates are found in Uzbekistan (4.1 in men; 0.9 in women), Tadjikistan (3.6 in men; 0.9 in women) and Turkmenistan (2.8 in men; 0.5 in women). There is very little variation in bladder cancer rates in women.

In general, the rates of bladder cancer in the U.S.S.R. are lower than those reported from North America and most registries of Europe, except from countries of Central and Eastern Europe. The highest estimated incidence rates for bladder cancer in men in the European Community countries are seen in Belgium (22.9) and Italy (22.8) [7, 8].

The highest male rates internationally are 27.8 (Switzerland, Basel), 24.7 (Denmark), 25.2 (United States, Connecticut) and 24.0 (Israel, among Jews born in Israel) [7].

An important risk factor for bladder cancer is tobacco smoking, but a variety of occupational exposures have also been identified. Such exposures may account for some 20% of all bladder tumours in industrialised countries [10, 23] but their contribution to the burden in the republics of the U.S.S.R. has not yet been quantified.

Other urinary tract (*ICD*9 184)

In 1989 in the U.S.S.R. there were 11 547 cases of malignant neoplasms defined at other urinary tract sites (i.e. other than the bladder) or 1.9% of all newly diagnosed cases of cancer. The incidence of cancer of other urinary organs (mainly kidney) is 5.1 in men and 2.5 in women. These rates are lower than the estimated incidence in the EC (8.0 in men; 3.8 in women) (Table 1) [8].

The highest rates of cancer of other urinary organs is observed in Estonia (10.6 in men; 5.2 in women), Lithuania (8.6 in men; 3.6 in women) and Latvia (8.3 in men; 4.4 in women). Very low rates are reported from Uzbekistan (1.6 in men; 1.0 in women), Turkmenistan (1.9 in men; 0.9 in women).

The high rates of cancer of the kidney in the Baltic states are comparable with the estimated incidence in most countries of

the EC, where the rates range from being highest in Germany (12.8 in men; 1.5 in women) to the lowest Portugal (0.7 in men; 0.3 in women), Spain (4.0 in men; 2.5 in women) and Greece (3.9 in men; 1.6 in women) [8].

Worldwide, very high rates of cancer of other urinary organs are reported from North America: Canada, Ontario (15.0 in men; 7.4 in women), U.S.A., Connecticut, white (9.9 in men; 4.2 in women), black (11.8 in men; 4.5 in women) and Iceland (12.2 in men; 7.6 in women). Low rates are observed in Asia and South America [7].

The risk of renal cancer has been found to be associated with cigarette smoking and this factor may explain some of the geographical variation of this cancer in the U.S.S.R. and elsewhere in the world [10, 23].

Non-Hodgkin lymphoma (ICD9 200 + 202)

The annual number of cases of lymphosarcoma or non-Hodgkin lymphoma (NHL) in the U.S.S.R. in 1989 was 7138 or 1.2% of all newly diagnosed cancer cases.

The incidence rate of NHL in the former U.S.S.R. is 3.0 in men and 1.7 in women, which is slightly lower than in the EC (5.4 in men; 3.1 in women). The highest incidence rate of lymphosarcoma is reported from Moldavia (4.9 in men; 4.6 in women), followed by Uzbekistan (4.0 in men; 2.6 in women) and Tadjikistan (3.5 in men; 2.1 in women). The lowest incidence rates are observed in Latvia (1.3 in men; 0.4 in women).

These rates are comparable with the estimated incidence in the EC countries where they vary from the highest rates in the Netherlands (7.8 in men; 4.9 in women) to the lowest rates in Portugal (1.1 in men; 0.7 in women) (8).

Among the international cancer registries the highest incidence rate of lymphosarcoma is observed in Israel among Jews born in Africa or Asia (9.2 in men; 3.4 in women), among Jews born in Israel (7.3 in men; 6.0 in women), among Jews born in Europe or America (7.1 in men; 5.3 in women) and in Basel, Switzerland (9.2 in men; 4.2 in women). High rates ranging from 4.0 to 7.0 are observed in some registries of North America, Australia, Hawaii. In most of the European registries incidence rates are below 4.0 [7].

Hodgkin's disease (ICD9 201)

The annual number of cases for Hodgkin's disease in the U.S.S.R. in 1989 was 644 of 1.1% of all newly diagnosed cancer cases.

The incidence of Hodgkin's disease of the U.S.S.R. as a whole is 2.6 in men and 1.8 in women. The highest rates of Hodgkin's disease are reported from Azerbaidjan (6.3 in men; 3.6 in women) and Armenia (5.0 in males; 2.9 in females). The lowest rates are found in Georgia (1.5 in men; 1.0 in women) and Kirgizia (1.5 in men; 0.7 in women) (Fig. 8).

The incidence rates of Hodgkin's disease observed in Azerbaidjan and Armenia are higher than any rates reported from the registries with highest rates of Hodgkin's disease such as Quebec, Canada (4.8 in men; 3.1 in women), Varese, Italy (4.7 in men; 2.5 in women), Ragusa, Italy (4.5 in men; 2.1 in females), the black population of Alameda in the U.S.A. (4.0 in men; 1.6 in women) and among the white population of Connecticut, U.S.A. (4.0 in men; 2.9 in women). In general, worldwide rates vary from less than 1 in Japan, China, Hong Kong, Singapore and 3 in North America, Europe and Australia [7].

The highest estimated incidence rates in the EC countries are in Ireland (4.1 in men; 1.9 in women) and Belgium (3.5 in men; 2.4 in women) [8].

There is no explanation of the high rates of this disease in Azerbaidjan and Armenia. No epidemiological studies have been carried out in these areas in relation to Hodgkin's disease.

Multiple myeloma (ICD9 203)

In 1989 in the U.S.S.R. there were 2543 cases of multiple myeloma or 0.4% of all newly diagnosed cases of cancer. The incidence of this disease in the U.S.S.R. is 0.9 in men and 0.7 in women. The highest incidence rates are observed in Estonia (2.4 in men; 1.5 in women), Latvia (1.7 in men; 1.2 in women) and Lithuania (1.4 in men; 1.7 in women) while the lowest rates are reported from Kirgizia (0.2 in men; 0.3 in women) and Tadjikistan (0.2 in men; 0.8 in women).

International comparisons suggest that the high incidence rates of multiple myeloma in the former U.S.S.R. are comparable with rates in North America and Europe and the lowest rates with those in the registries in Asia. It should be noted that worldwide the highest rates are registered in black population groups in the U.S.A. (Atlanta, 7.8 in men; 5.1 in women; New Orleans, 7.6 in men; 3.4 in women), in the Pacific Polynesian Islands and in New Zealand (7.6 in men; 2.1 in women) [7].

Lymphoid leukaemia (ICD9 204)

In 1989 there were 8621 cases of lymphoid leukaemia diagnosed or 1.4% of all newly diagnosed cases of cancer.

The incidence of lymphoid leukaemia in the former U.S.S.R. is 3.7 in men and 2.1 in women. The highest rates are reported

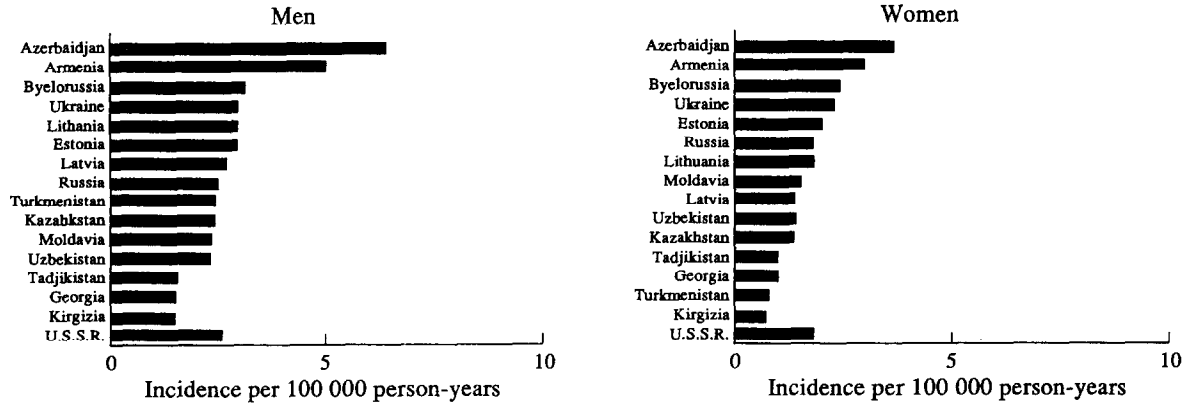

Fig. 8. Average, all-ages age-standardised incidence rates of Hodgkin's lymphoma in men and women in the 15 republics of the former U.S.S.R.

from Estonia (7.4 in men; 3.0 in women), Byelorussia (6.2 in men; 3.4 in women) and Ukraine (4.8 in men; 2.6 in women). The lowest rates are observed in Turkmenistan (1.1 in men; 0.8 in women), Uzbekistan (1.3 in men; 0.9 in women) and Tadjikistan (1.7 in men; 1.0 in women) (Fig. 9).

The high rates of lymphoid leukaemia observed in Estonia and Byelorussia are among the highest recorded internationally. The highest rates of lymphoid leukaemia are reported from Saskatchewan, Canada (6.5 in men; 3.3 in women), Ontario, Canada (6.0 in men; 3.4 in women), Iowa, U.S.A. (6.0 in men; 3.7 in women), and the white population of Hawaii (6.0 in men; 3.7 in women). In general, rates for men in other registries do not exceed 5.0 per 100 000 person-years [7].

Myeloid leukaemia (ICD9 205)

The annual number of cases of myeloid leukaemia is 3891 or 0.6% of all newly diagnosed cancer cases. The incidence rate of myeloid leukaemia in the U.S.S.R. is 1.4 in men and 1.1 in women. The highest rates are observed in Estonia (2.0 in men; 3.0 in women), Byelorussia (2.3 in men; 1.7 in women) and Armenia (2.3 in men; 3.1 in women), while the lowest rates are found in Tadjikistan (0.6 in men; 0.3 in women), Kirgizia (0.8 in men; 0.7 in women) and Kazakchstan (0.8 in men; 0.7 in women).

High incidence rates of myeloid leukaemia are comparable with those in Central and Eastern Europe. The rates for this disease internationally range from 0.4 (France, Calvados, rural) to 6.3 (Hawaii, Hawaiian). High rates are reported for other ethnic groups in Hawaii, in Maoris in New Zealand, in Australia and in some U.S.A. cancer registries [7].

Monocytic leukaemia (ICD9 206)

The annual number of cases of monocytic leukaemia in the U.S.S.R. was 1019 or 0.2% of all newly diagnosed cancer cases. The incidence of this disease for the U.S.S.R. as whole is 0.4 in men, 0.3 in women. The highest rates are observed in Georgia (1.0 in men; 0.6 in women) and Ukraine (0.7 in men; 0.5 in women). In some republics, such as Armenia, Byelorussia, Estonia and Tadjikistan no new cases of this disease were registered in 1989.

The incidence of monocytic leukaemia worldwide varies between 0.0 and 0.7 with the highest rates being observed in Slovenia (0.7 in men; 0.5 in women) and in Eindhoven, The Netherlands (0.6 in men; 0.4 in women) [7].

CANCER PATTERN BY REPUBLICS

The pattern of cancer in each of the 15 former republics of the former U.S.S.R. for the year 1989 has been considered. Lung cancer represents the commonest form of cancer among men in 11 of 15 republics, followed by stomach cancer. In Azerbaidjan, Tadjikistan and Uzberkistan stomach cancer remains the most frequent site followed by lung cancer, while in Turkmenistan the most frequent malignant neoplasm is cancer of the oesophagus, followed by stomach and lung cancer.

Other frequent sites of cancer in 15 republics are cancer of the mouth and pharynx, oesophagus, larynx, prostate, colon, rectum and bladder. In Kirgizia, the third most frequent cancer site in males is liver.

In women in 13 republics the leading malignant neoplasm is breast cancer, followed by stomach and cervical cancer. In Tadjikistan, the most frequent cancer in women is stomach cancer, followed by breast cancer and in Turkmenistan, cancer of the oesophagus, followed by breast cancer.

TIME TRENDS

Lung cancer

The annual number of newly diagnosed cases of lung cancer in the U.S.S.R. has doubled since 1971 and reached 112 373 cases in 1989. The age-standardised incidence rates per 100 000 person-years increased in males from 43.2 in 1971 to 71.7 in 1989 and in females from 6.1 to 8.4.

There is a statistically significant increase in the age-standardised incidence rates for lung cancer in all six republics except for females in Georgia and Latvia.

Statistically significant increases are also observed for virtually all age groups in males in all six republics, but only for some age groups in females. It is important to note a small but statistically significant decrease in lung cancer in males aged 30–39 in Georgia. Similar, but statistically non-significant trends are seen in Latvian men of the same age and Georgian, Lithuanian, Latvian and Estonian women in the age groups 30–39 and 40–49.

Stomach cancer

The annual number of newly diagnosed cases of stomach cancer decreased from 103 335 in 1971 to 94 363 in 1989. The age-standardised incidence rates per 100 000 person-years decreased in males from 57.4 in 1971 to 41.6 in 1989, and in females from 28.9 to 17.8.

Age-standardised incidence rates of stomach cancer have

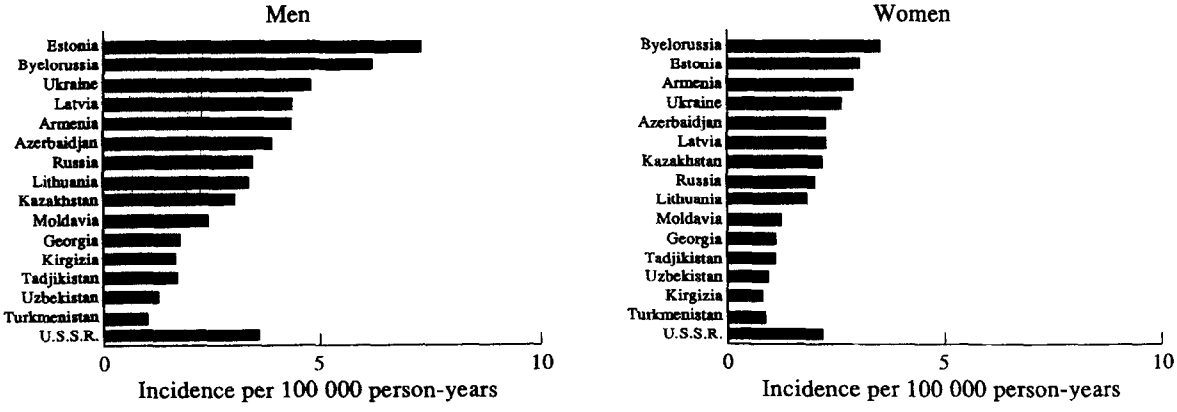

Fig. 9. Average, all-ages age-standardised incidence rates of lymphoid leukaemia in men and women in the 15 republics of the former U.S.S.R.

decreased substantially in all areas studied in both males and females, with the exception of the male population of Moldavia.

Statistically significant decreases in age-specific incidence rates are observed for both males and females for virtually all ages. It should be noted, however, that time trends are not statistically significant in Moldavia either in men or in women except for the age group 60–69 in men, where the decrease is statistically significant.

Breast cancer

The annual number of breast cancer cases in the U.S.S.R. has doubled since 1971 and reached 53 082 cases in 1989. Age-standardised incidence rates per 100 000 person-years increased from 15.2 in 1971 to 28.3 in 1989.

Statistically significant increases in age-standardised rates per 100 000 person-years of breast cancer are seen in all six republics. The increases affect practically all ages.

Cervical cancer

The annual number of newly diagnosed cases of cancer of the cervix decreased from 33 992 in 1971 to 24 161 in 1989. The age-standardised incidence rates per 100 000 person-years decreased from 21.4 to 12.6.

Statistically significant decreases in age-standardised incidence rates of cervical cancer are observed in all six republics studied. Decreases are observed also for the majority of age groups. However, statistically significant increases are seen in Byelorussia among women in the age groups 30–39 and 70+. Increases, although not statistically significant, are also observed in Byelorussia for ages 60–69, Estonia for the age group 30–39, and Lithuania for the age groups 30–39 and 70+, and in Georgia and Moldavia for the oldest age group.

CONCLUDING SUMMARY

Cancer has been and remains an important health problem in the republics of the former U.S.S.R. Importantly, the high and increasing levels of lung cancer in men present a potentially avoidable premature cause of death since this form of cancer is rapidly fatal. The low rates of breast cancer are, in fact, increasing and there is no indication that this increase will stop in the foreseeable future. There are other interesting patterns of cancer, notably of oesophageal cancer and cervical cancer, which can usefully be exploited to provide further insights and clues to the aetiology of cancer.

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