Pergamon

European Journal of Cancer Vol. 33, No. 7, pp. 991–996, 1997

Printed in Great Britain
0959-8049/97 $17.00 + 0.00

PII: S0959-8049(97)00129-9

Editorial

Cancer Burden in Europe for 1990: Can We Predict the Figures for the Year 2000?

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THE ARTICLE by Black and associates in this issue of the *European Journal of Cancer* (pages 1075–1107) on cancer incidence and mortality in the European Union shows that in 1990 almost 13 000 women and 14 000 men per week were diagnosed with cancer, and around 8000 women and 10 000 men died from this disease. These estimates of incidence are an update of global estimates made for 1980 [1] and are, therefore, very welcome. In addition, the data used in the article are available to anyone interested through the Eurocan90 computer disc, which can be purchased from IARC, and is a simple and inexpensive way of increasing the availability of more detailed data [2].

The incidence figures of 1990 are more precise compared to those of 1980. Black and associates rightfully state that the quality of the data has improved by the availability of data from more and better registries, especially of new member states (Finland, Sweden and possibly also Austria). In addition, the quality of data from some established members has improved, as for example, data from The Netherlands now covers the whole country, and data from France, Italy and Spain cover up to 10% of these populations. Overall, 40% of the EU population is now covered by cancer registration schemes, which is probably sufficient to give an idea of variation in incidence. This will certainly make future comparisons with the 1990 data more meaningful.

Nonetheless, for slow growing detectable tumours such as breast, colorectal, bladder and prostate cancer, detection biases may need to be addressed, e.g. by also presenting the proportions of patients with early stage, precursor or *in situ* lesions. Moreover, if a major objective of the EU and its Europe Against Cancer programme is to facilitate the coherent collation of these data, and thus assist countries without proper data, even greater value can be expected from the combined description of rare tumours, both for clinical and aetiological reasons.

Here, the data presented clearly need some augmentation and refinement. Oral cancers, leukaemias and non-Hodgkin's lymphomas and central nervous system tumours are in reality 'mixed bags' of quite a few different tumours (from 5 to 25 subtypes each). A number of rare tumours were not included in the article by Black and associates, such as childhood cancers, nasopharyngeal carcinoma, mesothelioma, mediastinal tumours, bone and soft tissue sarcomas (each a variety of many different tumours at a large number of sites), tumours of the vulva and vagina, ureter and urethra, penis, scrotum, eye and adrenal glands. Squamous and basal cell carcinomas of the skin were not included either, despite being approximately two and ten times more frequent, respectively, than skin melanoma but this was probably due to varying completeness of data.

Relevant subclassifications of some of the presented (more frequent) tumours according to histology (e.g. oesophagus, lung, ovary, cervix, thyroid and NHL) and/or subsite (oesophagus, stomach, colorectal and renal) could also be reported, as well as site distributions of carcinoid tumours, melanomas, sarcomas and extranodal lymphomas. For this purpose, much work is still to be done to show European patterns of the incidence of cancer, and the reporting of uncommon tumours requires a European perspective, following the example of the U.S.A. [3]. This may be important in the long term, since tumours which currently have a high incidence would have, at some time in the past, been relatively rare, and therefore attention to cancers which are now rare may be an effective early warning system for what could become prolific tumours in the future.

The Eurocim software package, currently only in use with the various cancer registries involved, could serve as a basis in this respect, but greater involvement by pathologists and clinicians will definitely become necessary. More detailed incidence data will soon be available in Volume VII of the IARC publication *Cancer Incidence in Five Continents*, which covers the period 1988–1992, and in a specific IARC monograph on the Incidence of Childhood Cancer, covering the period 1983–1992. In subsequent versions, both for clinical and aetiological reasons, some attention should also be paid to the contribution of multiple primary and contralateral cancers, which may comprise an increasing proportion, now up to 10% of all new cancers.

Received 21 Feb. 1997; accepted 28 Feb. 1997.

Table 1. Approximation of the weekly number of new cases with and deaths from cancer in the European Union in 1990 and 2000***

Tumour site	Number of new cases		Number of deaths	
	1990	2000**	1990	2000**
Oral and pharynx	975	1125	400	450
Oesophagus	425	500	450	500
Stomach	1600	1750†	1350	1400†
Colorectum	3750	4300	2100	2300
Pancreas	650	750	800	900
Liver	450	525	575	650
Larynx	475	550	250	275
Lung	3600	3950†	3450	3700†
Melanoma	550	650	150	175
Breast	3600	4300‡	1500	1650
Cervix	500	575	275	300
Corpus	650	750	175	200
Ovary	600	700	450	500
Prostate	1750	2100‡	1000	1100
Testis	200	230	20	25
Kidney	700	800	400	450
Bladder	1300	1500	600	650
Brain	475	550	375	425
Thyroid	200	230	70	80
Hodgkin's	180	200	65	70
Non-Hodgkin's	850	1000	400	450
Myeloma	300	350	250	275
Leukaemias	720	850	550	600

*Year divided into 50 weeks; **number in 2000 equal number in 1990 +15% (†10% and ‡20%) for new cases and +10% for deaths.

Mortality data, based on full coverage, remain as accurate as unchecked data can be, with general examination of individual files being impossible. This is especially a problem for data on the elderly, when multiple causes of death may play a role and when most deaths occur. Therefore, even taking into account the vast number of trend analyses of cancer mortality reported in this journal in recent years for adults [4] and children [5], a comparison of the 1990 estimates with the incidence and mortality data of 1980 has limited value. Therefore, the question of whether control, prevention and treatment of cancer has been successful since 1980, in part already answered by Sir Richard Doll in his 1990 EACR Mühlbock lecture [6], is better answered using the WHO database [7]. None the less, Black and associates suggest that the incidence of smoking-related cancers in males may be declining in North-Western Europe, but increasing in Southern and Eastern Europe, whereas rates for these cancers among females have risen in nearly all countries. Breast cancer incidence increased in most countries largely due to earlier and better detection by screening programmes, particularly in Sweden, where the largest discrepancy between incidence and mortality was seen. This is also likely to occur for prostate cancer in the 1990 s in those countries where PSA (prostate-specific antigen) testing has become more prolific.

In order to keep informed of trends, two of the most important reference documents which are currently available are the extensive work of IARC [8] and another extensive

Table 2. Ranking of European countries according to the incidence of cancer (all sites) in males and females (i.e. 1st, highest incidence in Europe; 15th, lowest incidence in Europe)

Country	Males		Country	Females	
	Incidence	Mortality		Incidence	Mortality
France	1st	2nd	Denmark	1st	1st
Netherlands	2nd	5th	Sweden	2nd	9th
Austria	3rd	9th	Netherlands	3rd	5th
Luxembourg	4th	3rd	Ireland	4th	3rd
Belgium	5th	1st	U.K.	5th	2nd
Germany	6th	8th	Austria	6th	8th
Italy	7th	4th	Luxembourg	7th	4th
Denmark	8th	6th	Belgium	8th	7th
U.K.	9th	7th	Germany	9th	6th
Finland	10th	12th	Finland	10th	11th
Spain	11th	11th	Italy	11th	10th
Ireland	12th	10th	France	12th	13th
Sweden	13th	15th	Portugal	13th	12th
Portugal	14th	13th	Spain	14th	14th
Greece	15th	14th	Greece	15th	15th

Table 3. Georgraphical variation of site-specific, age-adjusted incidence in the European Union in 1990: the three highest and lowest rates for each sex according to country

	High		Low	
	Males	Females	Males	Females
Austria**	Stomach	Stomach	NHL	
	Pancreas	Pancreas		
	Liver	Thyroid		
	Colorectum			
	Testis	Ovary		
	Bladder	Bladder		
	Kidney	Kidney		
	Prostate	Cervix		
Belgium‡	Lung	Larynx	Liver	Liver
	Thyroid	Breast	Pancreas	Cervix
		Brain	NHL	NHL and HD
Denmark*		Oral	Stomach	Stomach
		Colorectum	Thyroid	
		Pancreas		
		Larynx		
	Leukaemia	Lung		
	Melanoma	Breast		
		Cervix		
		Uterine corpus		
	Testis	Ovary		
Finland*	Pancreas	Pancreas	Oesophagus	
	Melanoma	Thyroid	Larynx	Larynx
	Prostate	NHL	Colorectum	Colorectum
	Kidney	Myeloma	Testis	Kidney
			Leukaemia	Leukaemia
France**	Oral	Oral	Stomach	Stomach
	Oesophagus		Pancreas	Bladder
	Larynx		Lung	Lung
			Brain	Brain
				Uterine corpus
Germany**	Colorectum	Colorectum	Prostate	NHL
	Testis		Brain	
	Thyroid			
	HD	HD		
Greece‡	Liver	Liver	Oral	Oral
	Brain	Brain	Oesophagus	Oesophagus
	HD	HD	Pancreas	Pancreas
			Colorectum	Colorectum
			Melanoma	Melanoma
				Breast
				Uterine corpus
				Ovary
			Kidney	Kidney
			Thyroid	Thyroid
			NHL	NHL
			Myeloma	Myeloma
Ireland**	Oesophagus	Oesophagus		Thyroid
	Pancreas	Larynx		Leukaemia
	Brain	Lung		
	Myeloma	Myeloma		
	Leukaemia	NHL and HD		
Italy**	Stomach	Stomach	Colorectum	Oesophagus
	Liver	Liver	Prostate	
	Bladder	Thyroid		
	NHL and HD	NHL		
	Leukaemia	Leukaemia		
Luxembourg‡	Oral			Stomach
	Colorectum	Melanoma		Liver
	Lung			Larynx
	Brain	Brain		Cervix
	Thyroid	Uterine corpus		Bladder

Table 3—*Continued*

	High		Low	
	Males	Females	Males	Females
Netherlands*	Lung	Oral	Liver	Liver
		Oesophagus		Cervix
		Colorectum		Brain
	Prostate	Breast	Leukaemia	Leukaemia
	Myeloma			
	NHL			
Portugal**	Stomach	Stomach		Oral
	Larynx	Leukaemia	Lung	Lung
			Pancreas	Pancreas
			Melanoma	Melanoma
			Testis	Ovary
			Kidney	Kidney
			Thyroid	HD
			Myeloma	Myeloma
Spain**	Oral	Liver		Oral
	Bladder			Oesophagus
	Larynx		Pancreas	Pancreas
				Colorectum
			Melanoma	Melanoma
				Lung
			Prostate	Breast
			Testis	Ovary
			Kidney	Kidney
			Brain	Brain
			Myeloma	Myeloma
				HD
Sweden*	Melanoma	Melanoma	Oral	
		Uterine corpus	Oesophagus	
		Ovary	Stomach	
		Bladder	Larynx	
	NHL	Kidney	Lung	
	Myeloma	Leukaemia		
U.K.*	Oesophagus	Oesophagus	Oral	
	Lung	Lung	Liver	Thyroid
		Bladder	Leukaemia	Uterine corpus

* Nationwide incidence registry; ** derived from regional incidence and national mortality; ‡estimation of incidence derived from mortality. NHL, non-Hodgkin's lymphoma; HD, Hodgkin's disease

overview by many distinguished authors [9], but there are also numerous papers on national or registry-based data that report time trends and, in particular, the more informative age–period–cohort analyses—one of the most interesting is a recent paper on worrying testicular cancer trends in Scandinavia and Eastern Europe since the 1950s [10].

One of the main uses of estimates of incidence and mortality is the prediction of the future burden of cancer. Do incidence and mortality data give the correct impression of the burden of cancer? Naturally, age-specific figures and the age distribution of the population are very important. For example, it can be estimated that 0.5–1% of all new patients will be children, while 20–30%, an ever increasing proportion, will be over the age of 75 years—for these elderly patients, quite impressive trends have already been foreseen [11]. These data can be easily obtained from the Eurocan90 disc.

The importance of incidence and mortality data will depend on the perspective of those who use the data. Healthcare providers, who need to plan the level of future services, will use the data to predict the number of new patients. However, public health officials may take a different view, using the data to determine where cancer prevention measures, such as health promotion or screening programmes, could be introduced to reduce the incidence or mortality, although having to accept the resulting major short-term increases in the prevalence and demand for care. Thus, data on mortality may generally give a good approximation of the annual expected number of patients who will need palliative and terminal care. Incidence data will give an impression of future treatment requirements if the data are stratified according to such factors as stage at diagnosis, histological type and, of course, age. This is also important for the planning and assessment of clinical trials. In order to estimate the demand for outpatient care, which is rising in most countries, prevalence data are needed. These are given on the Eurocan90 disc, but only include patients still alive 1, 3 and 5 years after diagnosis.

Because of the expected rise in demand for cancer-related services and the necessary adaptations in supply, it is essential to look ahead. Estimations for the year 2000 are now needed, and given the time lag for capital-intensive projects

and manpower planning, even estimations up to 2010 would be useful. Some tumour-specific calculations of weekly numbers of new patients and deaths in 1990 and 2000 are presented in Table 1. Those for the year 2000 are based on a 1.5% annual increase of new cases, mostly for demographic reasons (except for lung cancer and stomach cancer for which only a 1% increase is expected and 2% for breast and prostate cancer), and only 1% for cancer-related deaths because of favourable developments in early detection and treatment. Estimations have already been made for The Netherlands [12] and the Scandinavian countries, with unchanged age-specific incidence rates. The annual effect, albeit varying within and between countries, was generally between 1 and 2% per year, which amounts to increases of 10–20% in 10 years. Assuming a general tendency towards earlier diagnosis and more effective therapy, the number of prevalent patients, with an increasing proportion of cured patients and patients with second tumours, will increase, amounting up to 4% annually and up to 50% in 10 years. On the Eurocan90 disc, calculations for short-term prevalence are available in the various countries, moreover, the available population pyramids probably give a reasonable impression of the expected population changes in the years 1995, 2000 and thereafter.

From Table 2, the ranking of each country for overall cancer mortality and incidence can be seen. In general, when mortality has a lower ranking than incidence, the quality of care in that country may, on average, be better than that of countries in which the rank for mortality is higher than incidence, although this can also be influenced by high incidence rates of tumours with good prognosis. Tumour-specific geographical variation is shown in the article by Black and associates, but presented here is a summary for each country, considering the countries with the three highest and three lowest age-standardised incidence rates for each tumour (Table 3). As expected, geographical incidence rates varied between 2- and 6-fold and mortality between 2- and 4-fold, thus confirming the mortality-based analysis of avoidability of cancer in the U.S.A. by Doll and Peto [14]. Variation in incidence within Europe is substantial, but is not attributable just to differences in risk because there are also differences in medical practice and registration. According to Black and colleagues, differences in the latter will mostly affect incidence data for prostate, bladder and brain cancer. Differences in mortality can also occur due to differences in the quality of care, i.e. access to and organisation of specialised services [14, 15]. For tumour-specific variation amongst countries, higher mortality/incidence ratios could be caused by the combination of late diagnosis and/or suboptimal treatment.

A view of the possible future in certain countries is also indicated in Table 3. For instance, it illustrates striking differences between countries, for example, in alcohol-related oral and oesophageal cancers between Northern (particularly amongst women in Denmark, The Netherlands and France) and Southern countries (see Greece). No doubt this trend will be seen in most other countries in the near future. Again, for lung and laryngeal cancer, the epicentre appears to be in Southern countries for men, but in Northern countries for women, particularly in the U.K., Ireland, Denmark and The Netherlands, with the peak not having been reached yet. These two simple examples indicate that such comparisons, which are more accurate if the rates are age-specific, should focus on emerging epidemics within countries so that they can be prevented or at least minimised, rather than concentrating on epidemics already running their course, and which cannot be greatly influenced by interventions.

CONCLUSION

Considering the unavailability of reliable incidence data in some countries, such as Belgium or Greece, and in large parts of Germany, France, Italy and Spain, one wonders whether the EU should not make reliable registries mandatory, allowing them to work with data on identifiable patients, naturally in coded form where possible. Besides their pure epidemiological task, registry data are increasingly indispensable for outcome assessment, which should make it easier to predict the demand for and supply of cancer services more specifically. This requirement would certainly differ from the regulations on data protection that have threatened adequate functioning of registries for years. Along the same lines, problems of completeness could be solved by making it obligatory that causes of death become available to qualified researchers, instead of the current practice of burying them in archives or computer systems. Instead, added value should be obtained from the opportunities for European data sets and analyses of more detail, e.g. of uncommon tumours.

Let us hope that the interesting overview by Black and colleagues, and the practical Eurocan disc encourages greater interest, so that more specific estimates can be made of the certainly increasing burden of care in the next 15 years. Will the striking geographic variation, a consequence of differences in risk and medical care, be ironed out in the long term by economic monetary union within the EU, or will the cultural and climatological diversity prevail as an overriding influence on cancer risk?

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