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Original Paper

Cancer Survival From Incident Cases of a Population-based Study in the Umbria Region, Italy

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Survival of 12 051 cancer patients was investigated in incident cases registered in an *ad hoc* survey in the Umbria region for the period 1978–82. Death certificate only cases were excluded. The follow-up was carried out by an automatic link with the RENCAM (nominative register of causes of death) and verified at the Registrar's Offices of the various towns of the region. Both observed and relative survival rates according to sex and selected time periods (1, 5 and 10 years) were calculated. Generally, the relative survival rate for all tumour sites at 5 years was 0.35 in males and 0.53 in females ($P < 0.01$), and 0.31 and 0.49, respectively, at 10 years. 5-year relative survival rates greater than 0.50 were found for only three tumour sites in men (bladder, larynx, colon), accounting for approximately 21% of all men included in the study, but for six sites in females (breast, uterus, kidney, bladder, rectum, colon), accounting for more than 50% of the female cases. The 5-year age-adjusted relative survival rates in Umbria were higher than in other Italian and European registries for selected sites (stomach, colon, rectum, lung). High survival in Umbria could probably be related to the availability of specialist care and to the easy access to a network of oncological services. © 1997 Elsevier Science Ltd.

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INTRODUCTION

CANCER SURVIVAL studies are commonly based on data derived from hospital or population cancer registries. In the former, survival analysis can be used to evaluate the efficacy of therapeutic protocols and diagnostic procedures. In the latter, monitoring of survival trends in a population, possibly together with those of incidence and mortality, can constitute an indicator of both the efficacy of diagnostic and therapeutic procedures and efficiency of health structures in a certain geographic area. Hospital data give greater details of biological and clinical characteristics, but population-based survival reflects the effectiveness of the overall cancer control strategy in a region [7, 10, 11].

In Umbria, a central Italian region with a population of 807 552 inhabitants at the 1981 census, there are no data currently available from a population-based cancer registry, so the first survival data will not be available for a few years. Therefore, during the period 1978–1982, an *ad hoc* survey was carried out, using data for new cases of disease obtained from case records of the hospitals in the region, to study survival rates up to 10 years for 12 051 incident cancer cases. The quality of the data was similar to that of registries [5, 9, 12].

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PATIENTS AND METHODS

The present data, from 6498 men and 5553 women, were derived from an *ad hoc* survey of incident cancer cases in the Umbria region in the period 1978–1982, although to minimise the probability of under- or over-registration, data collection covered the period 1976–1986 [9]. Cases of disease were obtained from case records of all diagnostic and therapeutic services at public and private hospitals in the region and those of the principal national oncological centres. For each case, name, surname, age, sex, address, municipality of birth and residence, date of diagnosis, cancer site (ICD-9) [13] were recorded from the clinical archives.

The follow-up was carried out mainly by direct verification at the Registrar Offices of several municipalities, and also by examining the regional registry of mortality (RENCAM) and

the regional list of persons covered by the National Health Service. The vital status of each registered case was verified up to 31 December 1993. The final number for the present analysis was 12051 (6498 men; 5553 women). The 1981 census resident population was used as denominator.

The cancer sites considered are reported in Table 1. The skin carcinomas (173 ICD), others and ill-defined sites (195 ICD) and secondary or unspecified cancers (196–199 ICD) were excluded from the survival analysis. There are no morphological or clinical variables because the original incident data did not report these.

The reliability of incident data, as requested for Cancer Registries in 'Cancer Incidence in Five Continents, Vol. IV, 1982' [12], was tested examining the proportion of cases with histological or cytological verifications and the mortality/incidence ratio (0.57 for all sites). The stability of rates was verified calculating the per cent variation ((max–min)/mean) in the number of registered cases, within the 5 years, that was 5.1%. There were no cases for which the age was not known. The percentage of multiple cancers was close to 5% and the proportion of other and unspecified neoplasms (195–199 ICD) was 0.68%.

The differences between the means of incidence age were tested using Student's *t*-test. Survival analysis was carried out by the Kaplan–Meier method [4, 6], and the significance of differences between observed survival curves was tested by means of the log-rank test [6, 8].

For computation of relative survival rates [3] (the ratio of observed survival rate for the patient group against expected survival rate for the general population), life expectancy for age and sex was obtained from Umbria 1981 lifetables, calculated by ourselves starting from official mortality and population data. There are no official life tables published by the authorities.

Comparisons with EUROCARE countries were made using age-adjusted relative survival rates, computed by the direct method; the population of cases from the whole set of EUROCARE data, for a given site, was used as a standard [2].

RESULTS

There were 6659 men and 5677 women incident cases in the period 1978–82, but 285 patients were lost at follow-up (Table 1). The overall proportion of cytological and histological verifications (75.5% for all cancer sites) was similar to that of the Varese Cancer Registry and of some foreign registries [1, 12]; the lowest proportion was found for pancreas cancer in both sexes, the highest for uterus cancer in women and the larynx in men. The highest mean incident age was for prostate cancer in men (72.9 years) and pancreas cancer in women (70.2 years), while the lowest mean incident age was for leukaemia in men (58.6 years) and for ovarian cancer in women (57.5 years).

Table 2 gives the 1, 5, 10-year observed and relative survival rates by sex and primary tumour sites. The survival rates for oesophagus and larynx cancer sites are only reported for males due to the very small number of cases found in women. Relative survival rates at selected time intervals (1, 5, 10 years) were significantly higher ($P < 0.01$) in women than in men for all sites (15, 18 and 18% more, respectively), and for rectal cancer (Table 2). For most sites, the decrease in survival

Table 1. Number of cases studied, numbers lost, mean age of incidence and per cent of cytological and histological verifications (%HV), by sex and primary cancer sites

Tumour site (ICD-IX)	Sex	Cases included in analysis	Excluded cases lost to follow-up	Mean age	%HV
Oesophagus (150)	M	88	0	65.4	53
Stomach (151)	M	913	15	65.7	62
	F	548	15	68.7	55
Colon (153)	M	486	11	66.7	63
	F	505	15	66.4	62
Rectum (154)	M	419	10	67.3	76
	F	271	7	65.8	74
Liver (155)	M	205	7	65.9	54
	F	182	4	67.9	50
Gallbladder (156)	M	70	0	67.6	68
	F	109	3	69.6	73
Pancreas (157)	M	202	4	64.9	42
	F	137	4	70.2	39
Larynx (161)	M	322	5	61.6	99
Lung (162)	M	1178	27	63.6	48
	F	169	6	66.3	49
Breast (174)	F	1512	40	59.2	90
Uterus (179–182)	F	653	16	59.5	98
Ovary (183)	F	217	7	57.5	81
Prostate (185)	M	510	12	72.9	63
Bladder (188)	M	566	9	66.2	83
	F	121	5	70.1	76
Kidney (189)	M	137	1	63.5	82
	F	80	3	61.0	77
Leukaemias (204–208)	M	239	6	58.6	83
	F	164	7	58.2	76
All sites	M	6498	161	64.2	73
	F	5553	124	62.3	78

rates between 5 and 10 years after diagnosis was smaller than that between 1 and 5 years. An exception to this was breast cancer, which showed an almost constant decrease in survival from 1 to 10 years after diagnosis. The lowest 5- and 10-year relative survival rates were found for liver and pancreatic cancers in both men and women.

Figure 1 gives separate curves according to gender for selected and all cancer sites. The variation in both observed and relative survival rates was remarkable. Women with cancer of uterus had the best 5- and 10-year relative survival rates of any cancer site presented, being 0.71 and 0.72, respectively. Breast cancer, which accounted for approximately 27% of all the female cancers, showed a 5-year relative survival rate of 0.71 and a 10-year survival rate of 0.59, whereas the corresponding rates for lung, which was the most important cancer of the men (18%) were 0.11 and 0.10. The 5- and 10-year relative survival rates for colon cancer were double those for stomach cancer (0.50 versus 0.26) in both sexes (Figure 1). The observed survival rate for prostate cancer at 10 years was 0.12, but relative survival was much higher (0.29) due to patients with cancers that were diagnosed at a very old age.

DISCUSSION

The data set we used was from an *ad hoc* investigation and not from a cancer registry, but the quality of results and the long-term follow-up with meaningful information up to 10 years for all cancers is an important point of the present analysis.

The quality of the original data can be considered acceptable in relation to the criteria proposed by the International Agency for Research on Cancer for Cancer Registries [12]. As regards DCO cases, it should be noted that in the original *ad hoc* survey, to avoid the risk of over-registration, these cases were disregarded because of the relatively short (5-year) period considered. Clearly, this may have resulted in an underestimation of the real incidence (by approximately 5%), but does not bias the evaluation of survival rates that are naturally calculated excluding death certificate cases. The quality of data was examined at the time of registration, both from the point of view of diagnosis and residence, and the only cases excluded from final survival analysis were those lost to follow-up. The low number of these, principally due to the mistakes of municipalities' registrations and the similar distribution among cancer sites, confirms the accuracy in verifying the residence of patients.

Relative survival rate for all tumour sites at 5 years was 0.35 in men and 0.53 in women: the difference was significant and was also high at 10 years (0.31 in males and 0.49 in females).

The mean age at diagnosis was 2 years less in women than in men, probably due to early age of onset of breast and uterine cancers (on average < 60 years).

Since the difference in survival rates between men and women for each cancer site was never significant (except for rectum cancer), the higher survival found for women is probably due to the good prognosis for breast and uterus cancers and poor prognosis for prostate cancer.

Table 2. Observed (OS) and relative (RS) survival rates from various cancers at selected time intervals by sex. Umbria incident cases, 1978–82

Tumour site (ICD- IX)	Sex	1 year		5 years		10 years		Log-rank
		OS	RS	OS	RS	OS	RS	*P* values*
Oesophagus (150)	M	0.31	0.32	0.09	0.11	0.07	0.12	
Stomach (151)	M	0.46	0.48	0.20	0.25	0.14	0.23	
	F	0.47	0.49	0.23	0.28	0.18	0.29	> 0.05
Colon (153)	M	0.67	0.70	0.39	0.50	0.29	0.51	
	F	0.68	0.70	0.46	0.55	0.35	0.52	> 0.05
Rectum (154)	M	0.67	0.70	0.36	0.47	0.23	0.42	
	F	0.76	0.78	0.48	0.56	0.37	0.53	< 0.01
Liver (155)	M	0.17	0.18	0.01	0.01	0.00	0.00	
	F	0.19	0.20	0.00	0.00	0.00	0.00	> 0.05
Gallbladder (156)	M	0.31	0.32	0.09	0.12	0.06	0.11	
	F	0.28	0.29	0.06	0.07	0.06	0.09	> 0.05
Pancreas (157)	M	0.22	0.23	0.00	0.00	0.00	0.00	
	F	0.29	0.30	0.01	0.01	0.00	0.00	> 0.05
Larynx (161)	M	0.79	0.81	0.54	0.63	0.41	0.58	
Lung (162)	M	0.35	0.36	0.10	0.11	0.06	0.10	
	F	0.40	0.41	0.17	0.20	0.12	0.18	> 0.05
Breast (174)	F	0.89	0.91	0.64	0.71	0.47	0.59	
Uterus (179–182)	F	0.85	0.86	0.65	0.71	0.58	0.72	
Ovary (183)	F	0.64	0.65	0.36	0.39	0.30	0.36	
Prostate (185)	M	0.69	0.74	0.26	0.38	0.12	0.29	
Bladder (188)	M	0.74	0.78	0.50	0.64	0.34	0.58	
	F	0.71	0.74	0.45	0.58	0.33	0.56	> 0.05
Kidney (189)	M	0.66	0.68	0.37	0.45	0.26	0.42	
	F	0.69	0.70	0.53	0.59	0.41	0.53	> 0.05
Leukaemias (204–208)	M	0.59	0.61	0.26	0.32	0.14	0.22	
	F	0.56	0.58	0.24	0.28	0.14	0.19	> 0.05
All sites	M	0.55	0.57	0.28	0.35	0.19	0.31	
	F	0.70	0.72	0.46	0.53	0.36	0.49	< 0.01

*Significance of difference in survival rates between males and females.

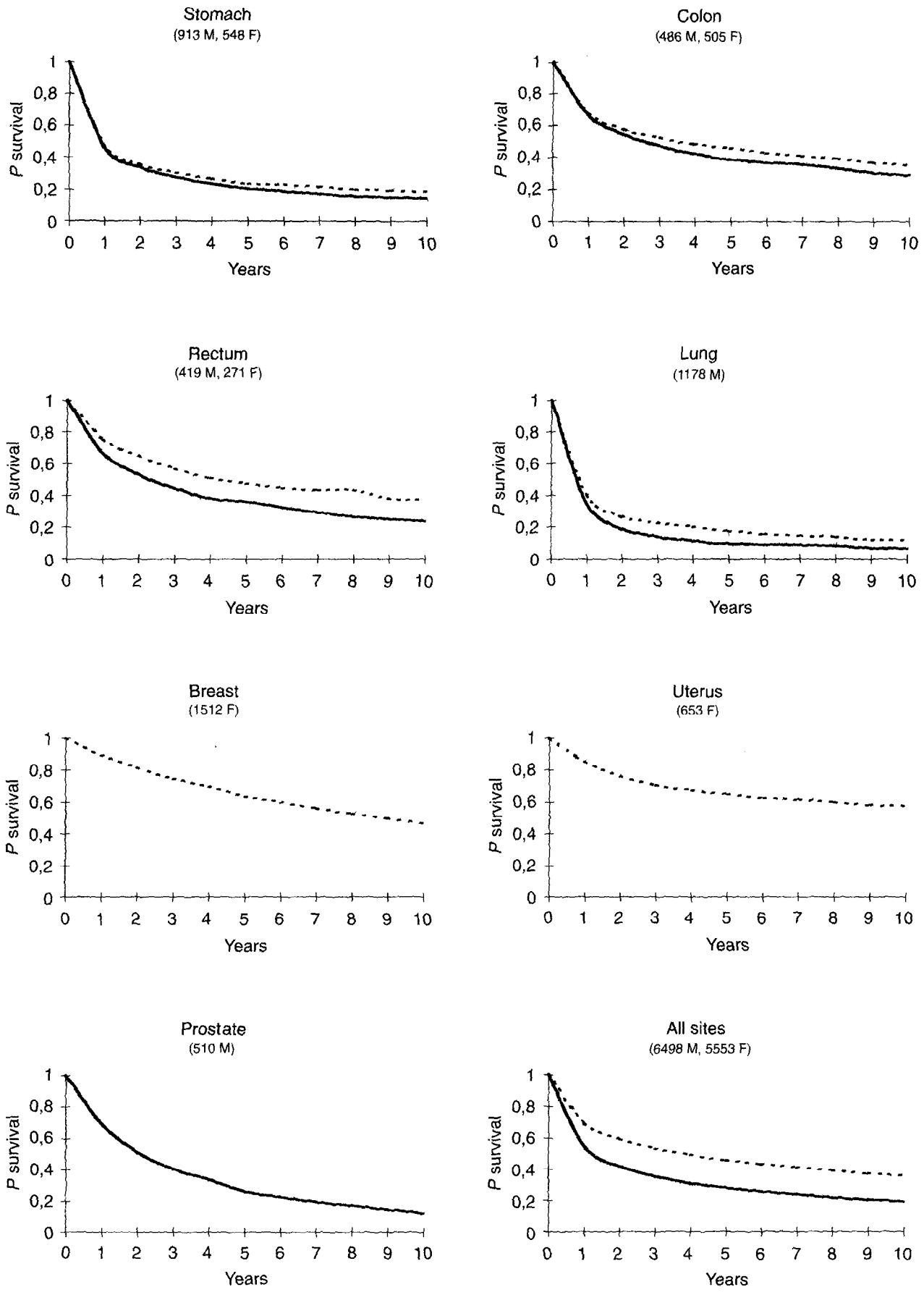

Figure 1. Relative survival rates for selected cancer sites by sex. Number of incident cases. Umbria Region, 1978–82 (in brackets) (—males, - - - - -females).

Table 3. Age-adjusted relative survival rates, at 5 years, in Umbria and in European Registries [2]

Registries	Period of diagnosis	Stomach		Colon		Rectum		Lung		Breast
		M	F	M	F	M	F	M	F	F
Umbria	1978–82	0.23	0.27	0.46	0.52	0.42	0.54	0.11	0.17	0.70
Italian registries	1978–85	0.16	0.21	0.38	0.44	0.32	0.34	0.06	0.11	0.71
Denmark	1978–84	0.12	0.15	0.37	0.40	0.35	0.40	0.06	0.06	0.68
Dutch registries	1978–85	0.18	0.20	0.47	0.47	0.39	0.46	0.11	—	0.70
English registries	1978–84	0.08	0.09	0.35	0.34	0.35	0.36	0.06	0.05	0.63
Estonia	1978–84	0.15	0.15	0.29	0.33	0.28	0.35	0.06	0.08	0.59
Finland	1978–84	0.16	0.17	0.48	0.45	0.41	0.45	0.09	0.10	0.74
French registries	1978–85	0.17	0.21	0.45	0.45	0.38	0.45	0.09	0.13	0.71
German registries	1978–84	0.19	0.22	0.46	0.41	0.38	0.40	0.08	0.10	0.68
Polish registries	1978–84	0.07	0.16	0.18	0.20	0.12	0.25	0.05	0.10	0.44
Scotland	1978–82	0.07	0.09	0.37	0.34	0.30	0.34	0.06	0.06	0.62
Spanish registries	1980–85	0.11	0.14	0.46	0.43	0.33	0.34	0.05	—	0.63
Swiss registries	1978–84	0.23	0.24	0.50	0.57	0.49	0.57	0.12	0.12	0.76
European registries	1978–85	0.14	0.18	0.41	0.40	0.34	0.38	0.07	0.09	0.67

5-year relative survival rates higher than 0.50 were found for only three tumours sites in men (bladder, larynx, colon), and six sites (breast, uterus, kidney, bladder, rectum, colon) in women, that is, approximately 21% of men and more than 50% of women included in the study. This high survival rate value for women is similar to that found by the EUROCARE study (45% of all female cases had up to 0.50 survival rates at 5 years), but very different for male cases (5% of all patients) [2]. The lowest 5-year relative survival rates were found for liver and pancreas cancers in both men and women, comprising approximately 6% of male and female patients.

Comparing the data with Italian and other European registries, we found Umbria age-adjusted relative survival rates at 5 years much better than Italian registries for stomach, colon, rectum and lung cancer sites (Table 3); the survival rates for breast cancer were quite similar. Also, the 5-year relative survival rates in Umbria were generally higher than in other European areas, but lower than that observed in Switzerland for the selected sites (Table 3). Survival in Switzerland is probably slightly overestimated, because of the censoring of foreign residents who emigrate after diagnosis (selection effect) [2]. In our data, we cannot exclude that those lost to follow-up—even if a very small proportion (approximately 2.3%)—represent a biased subgroup with respect to outcome, so that the survival rate is overestimated. Moreover, it must be considered that more complete comparisons cannot be made by morphological or clinical variables because of their absence in the original data. Nevertheless, the survival rates were high, probably related to the level of availability of specialist care and to an easily accessible network of oncological services. The quality of oncological care includes an adequate number of specialist, regional tumour study groups and participation in clinical trials [5]. Moreover, in 1994, the population-based Cancer Registry project was begun. It appears that the regional community is health conscious about control of tumour disease.

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