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Original Paper

Variation in Survival of Patients with Lung Cancer in Europe, 1985–1989

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In this study, we report on the variation in the prognosis for adult patients with lung cancer within Europe, by age, histology and country from 1985–1989. We considered trends in survival since 1978 for most countries. Survival analysis was carried out on 173 448 lung cancer cases diagnosed between 1985 and 1989 in 44 population-based cancer registries, participating in the EUROCARE study. Relative 1-year survival rates for patients with lung cancer varied from 24 to 40%, being highest in Finland, France, The Netherlands and Switzerland and lowest in Denmark, England, Poland and Scotland. Half of all patients under the age of 45 years died within 1 year of diagnosis, increasing to almost 80% for those aged 75 years or older. Whilst the prognosis for patients with non-small cell carcinoma remained more or less constant between 1978 and 1989 (25% in Denmark and 44% in Finland), that for patients with small cell carcinoma improved slightly, especially in The Netherlands (Eindhoven from 17 to 24%) and Switzerland (Geneva from 24 to 32%). In conclusion, a fairly large variation in lung cancer relative survival rates existed between European countries. The most likely explanation for the differences is the variation in access to specialised care. Except for a slight improvement in short-term survival for patients with small cell lung cancer, survival has remained poor since 1978. © 1998 Elsevier Science Ltd. All rights reserved.

Key words: lung cancer, survival, trends, histology, Europe

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INTRODUCTION

LUNG CANCER is the most frequent or second most frequent type of cancer among European men and ranks third or higher among European women [1]. Prognosis for both men and women is poor, but it has been reported to have improved for patients with small cell carcinoma since the introduction of chemotherapy in the 1970s [2–6]. Besides being dependent on age and tumour stage, survival rates for lung cancer differ according to histological subtype, being better for non-small cell carcinoma than for small cell carcinoma [7–10]. In the first EUROCARE study [11], relative 5-

year survival rates of lung cancer varied from 6 to 14%, being lowest in England and highest in Switzerland. The collaboration across Europe in the EUROCARE study has now been extended to 45 registries in 17 countries that have accumulated data currently on 3.5 million new patients, most diagnosed between 1978 and 1992. We report on variation in the relative survival of adult patients according to age and histology from 1985–1989 and also explore major time trends since 1978 for most countries.

PATIENTS AND METHODS

Survival analysis was carried out on 173 448 lung cancer cases diagnosed between 1985 and 1989 in 17 countries, recorded in 44 population-based cancer registries. Some registries (Finland, Denmark, Estonia, Slovenia, Iceland,

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Scotland and Slovakia) cover the whole country, others a large proportion (England) and the rest up to 20% (Italy, Spain, France, The Netherlands, Germany and Sweden).

Cases discovered at autopsy, first diagnosed with another tumour, or known only on the basis of a death certificate (DCO) were not included in the survival analysis. The protocol

Table 1. Number of lung cancer patients by age group, 1985–1989 (EUROCARE II)

	% DCO	Age (years)					Total
		15–44	45–54	55–64	65–74	75–99 (%)	
Northern Europe							
Iceland	0	5	41	109	137	92 (24)	384
Finland	1	204	762	2940	3536	2107 (22)	9549
Sweden*	0	72	226	549	817	524 (24)	2188
Denmark	0	373	1399	4094	5884	3645 (24)	15 395
U.K.							
Scotland	6	331	1489	5466	7907	5788 (28)	20 981
England	12	1173	4651	18 237	29 942	23 423 (30)	77 426
Western and Central Europe							
The Netherlands*	0	59	249	682	849	494 (21)	2333
Germany*	15	68	357	841	757	551 (21)	2574
Austria*	16	18	60	142	131	136 (28)	487
Switzerland*	0	52	203	456	524	427 (26)	1662
France*	0	154	384	989	828	490 (17)	2845
Southern Europe							
Spain*	10	211	539	1355	1556	818 (18)	4479
Italy*	4	306	1424	4044	4047	2649 (21)	12 470
Eastern Europe							
Slovenia	3	181	645	1432	924	560 (15)	3742
Slovakia	9	450	1740	3905	2835	1582 (15)	10 512
Poland*	5	130	463	1280	909	543 (16)	3325
Estonia	0.2	89	500	1300	791	416 (13)	3096
Europe	–	3876	15 132	47 821	62 374	44 245	173 448

* < 20% of the national population covered.

Table 2. Relevant proportional distribution of adult patients with lung cancer, according to histology, 1985–1989 (EUROCARE II)

	% HV	Proportional distribution (%)		
		Small cell	Non-small cell	Not specified
Northern Europe				
Iceland	85	22	73	5
Finland	91	18	60	22
Sweden*	99	18	82	0
Denmark	88	19	63	18
U.K.				
Scotland	61	15	46	39
England	58	11	41	48
Western and Central Europe				
The Netherlands*	95	17	75	8
Germany*	82			
Austria*	88	20	56	14
Switzerland*	99	20	80	0
France*	95	15	75	10
Southern Europe				
Spain*	90	18	66	16
Italy*	72	11	55	34
Eastern Europe				
Slovenia	87	19	69	12
Slovakia	79	16	66	18
Poland*	68	14	47	39
Estonia	69	18	39	43
Europe	–	14	49	37

* < 20% of the national population covered; HV, histological verification; – no data available.

Table 3. 1 and 5-year relative survival of adult patients with lung cancer (1985–1989) by country and age (males and females combined) (EUROCARE II)

Age (years)	1-year survival rate (%)			5-year survival rate (%)		
	15–44	55–64	75 +	15–44	55–64	75 +
Northern Europe						
Iceland	60	44	27	–	12	12
Finland	48	45	31	24	13	4
Sweden*	45	26	24	15	11	6
Denmark	36	29	15	13	8	2
U.K.						
Scotland	31	28	14	14	8	2
England	36	27	15	17	9	3
Western and Central Europe						
The Netherlands*	42	45	28	19	15	7
Germany*	47	36	22	24	12	5
Switzerland*	50	47	27	24	13	5
France*	48	42	30	20	14	6
Southern Europe						
Spain*	36	34	23	18	13	10
Italy*	39	36	22	16	12	5
Eastern Europe						
Slovenia	33	35	15	11	8	5
Slovakia	40	35	28	19	12	17
Poland*	47	32	15	16	8	3
Estonia	40	31	24	21	8	5
Europe	42	35	21	18	11	5

* < 20% of the national population covered.

specified a minimum follow-up of 5 years (unless death intervened). The proportion of patients who were lost-to-follow-up was less than 1%, except for Switzerland (1.1%) and Poland (1.3%). The number of patients according to age is shown in Table 1. The proportion of patients aged 75 years or older was lowest in eastern countries and highest in the U.K.

A selection of cancer registries with data covering the whole 1978–1989 period were used for trend analysis [12]. The following 3-year periods were used: 1978–1980; 1981–1983; 1984–1986; and 1987–1989. Age-standardised relative survival was computed as the ratio between the observed (crude) survival and the expected survival, derived from

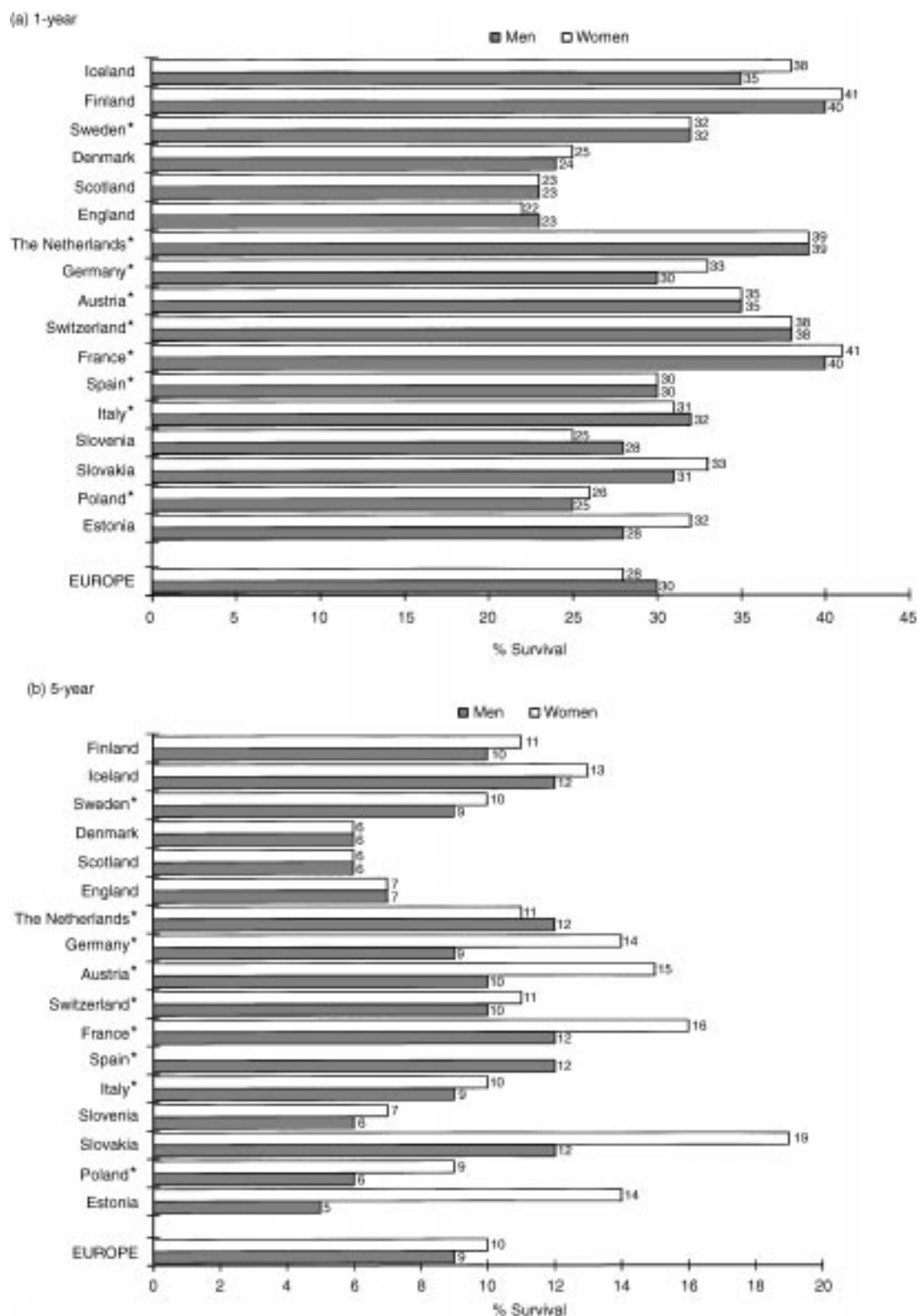


Figure 1. Relative 1-year (a) and 5-year (b) survival rates (age standardised) for lung cancer patients, 1985–1989 (EUROCARE II). * < 20% of the national population covered. Please note differences between the scales for (a) and (b).

general mortality data [13]. The European estimates were weighted, according to the national incidence (reflecting the size of the population). Standard errors were calculated according to Greenwood's formula [14].

For special (crude) survival analyses, according to histological subtype, carried out at the Eindhoven Cancer Registry, only data of cancer registries with enough cases and a high proportion of histologically verified and specified cases (> 75%) was used: Denmark, Finland, France (Calvados and Doubs), Italy (Varese), The Netherlands (Eindhoven), Sweden and Switzerland (Geneva). Lung cancer was classified as small cell lung cancer (ICD 8002, 8041–8044) and non-small cell lung cancer (ICD 8012–8040, 8047–9580). Between 1985 and 1989, 84 383 (19%) patients were

diagnosed with non-small cell tumours, 23 780 (14%) with small cell tumours and 65 285 (37%) with lung tumours that were not specified histologically. In regions with more than 75% of histologically verified cases, the proportion of small-cell carcinoma varied between 15 and 21% and the proportion of non-small cell carcinoma between 60 and 82% (Table 2).

RESULTS

Overall relative 1-, 3- and 5-year weighted survival rates for European men were 31, 12 and 10%, respectively and for women 29, 13 and 11%, respectively. Age-standardised survival rates varied greatly within Europe. Relative 1-year survival rates were approximately 40% in Finland, France, The Netherlands and Switzerland and approximately 24% in

Table 4. Change in age-standardised relative 1-year survival (%) of adult patients with lung cancer over time, according to gender, 1978–1989 (EUROCARE II)

	% 1-year survival (95% confidence intervals)			
	1978–1980	1981–1983	1984–1986	1987–1989
(a) Males				
Northern Europe				
Iceland	27 (19–37)	32 (23–42)	42 (33–52)	33 (25–42)
Finland	40 (39–41)	41 (39–42)	41 (40–42)	38 (37–40)
Sweden*	30 (27–33)	33 (30–36)	32 (30–35)	31 (28–34)
Denmark	24 (23–25)	24 (23–25)	24 (23–25)	24 (23–26)
U.K.				
Scotland	20 (20–21)	22 (21–23)	22 (22–23)	23 (22–24)
England	21 (20–21)	22 (22–23)	22 (22–23)	23 (22–23)
Western and Central Europe				
The Netherlands*	37 (34–40)	39 (36–42)	40 (37–43)	38 (36–41)
Germany*	27 (24–29)	29 (26–31)	30 (28–33)	30 (27–32)
Switzerland*	36 (32–41)	36 (32–41)	37 (32–42)	42 (37–47)
France*	39 (35–44)	39 (35–43)	38 (35–42)	38 (35–42)
Southern Europe				
Italy*	28 (25–30)	31 (28–33)	30 (28–32)	33 (30–36)
Eastern Europe				
Poland*	23 (20–27)	18 (15–22)	22 (18–25)	25 (22–29)
Estonia	31 (28–34)	27 (25–30)	27 (24–29)	28 (26–31)
Europe	27 (26–28)	28 (27–29)	29 (28–30)	29 (28–30)
(b) Females				
Northern Europe				
Iceland	33 (23–45)	28 (20–38)	36 (27–46)	38 (28–48)
Finland	41 (37–45)	40 (37–44)	40 (37–43)	42 (39–45)
Sweden*	35 (29–41)	32 (27–38)	34 (29–40)	33 (28–38)
Denmark	23 (21–25)	24 (23–26)	24 (22–26)	25 (24–27)
U.K.				
Scotland	20 (18–21)	22 (21–24)	22 (20–23)	23 (22–24)
England	19 (18–20)	21 (20–21)	22 (21–22)	22 (21–23)
Western and Central Europe				
The Netherlands*	37 (27–51)	30 (21–42)	35 (26–44)	41 (34–48)
Germany*	35 (28–43)	28 (21–36)	28 (22–35)	33 (27–40)
Switzerland*	42 (32–53)	35 (25–47)	39 (30–48)	38 (29–47)
France*	41 (29–55)	†	37 (27–49)	44 (35–55)
Southern Europe				
Italy*	22 (16–28)	31 (25–38)	30 (25–36)	38 (31–45)
Eastern Europe				
Poland*	22 (15–30)	26 (19–33)	33 (26–41)	29 (24–35)
Estonia	32 (26–39)	28 (22–35)	30 (25–37)	32 (27–38)
Europe	26 (24–28)	25 (23–27)	26 (25–28)	28 (27–30)

* < 20% of the national population covered; †insufficient cases to calculate 95% confidence intervals.

Table 5. Trends in crude 1-year survival rates of adult patients with lung cancer (%), according to histology, 1978–1989 (EUROCARE II)

	Small cell		Non-small cell	
	1978–1984	1985–1989	1978–1984	1985–1989
Finland	25	24	44	44
South-Sweden	*	18	29	30
Denmark	17	19	25	24
Eindhoven (The Netherlands)	17	24	41	41
Doubs and Calvados (France)	31	35	42	40
Varese (Italy)	24	26	34	34
Geneva (Switzerland)	24	32	36	40

*Not classified as a distinct subtype, but included in large cell and undifferentiated carcinoma until 1983.

Denmark, England, Poland and Scotland. Age-standardised relative 5-year survival rates were highest in France, Iceland, The Netherlands, Slovakia and Spain (12%) (Figure 1). Relative 1-year survival rates decreased with increasing age from 42% for the age group 15–44 years to 21% for those of or over 75 years of age (Table 3). Similarly, 5-year survival rates decreased from 18% in the 15–44 age group to 5% in those of or over 75 years of age (Table 3). In most countries relative 1-year survival rates remained relatively stable since 1978 (Table 4). In an analysis of survival, according to histology in seven cancer registries with more than 75% of cases microscopically confirmed, the prognosis for patients with non-small cell carcinoma was approximately 50% better than for those with small cell carcinoma (Table 5). In most countries survival for non-small cell carcinoma remained stable between 1978 and 1989, but it increased slightly in Geneva. Survival for small cell carcinoma increased slightly in most countries, especially in France, The Netherlands (Eindhoven) and Switzerland (Geneva) (Table 5).

DISCUSSION

Survival for patients with lung cancer varied considerably within Europe, as illustrated by 1-year relative survival rates, which were lowest for patients in Denmark, Poland and the U.K. and highest for those in Finland, France, The Netherlands and Switzerland. Half of all patients under the age of 45 years died within 1 year of diagnosis, increasing to almost 80% for those aged 75 years or older. Whilst the prognosis for patients with non-small cell carcinoma remained relatively constant between 1978 and 1989, that for patients with small cell carcinoma improved slightly, especially in Switzerland and The Netherlands, where the improvement was limited to the first 18 months [6].

The lower survival rates for patients with lung cancer in the U.K. may be partly explained by poor access to specialised care; the number of consultants is lower than in most other European countries [15–18], the percentage of histological verification was considerably lower (Table 2) and the proportion of patients receiving 'curative' treatment was also much lower [17]. The age-standardised relative 1 and 5-year relative survival rates in Europe (31 and 10%, respectively) were almost identical to those in the U.S.A. (30 and 12%, respectively) [9, 18, 19].

The lower survival rate for the elderly may not only be explained by a worse access to specialised care, but also by the fact that the elderly often present with co-morbidity at the time of diagnosis. Co-morbidity influences treatment choice [20], and is also an independent prognostic factor [21–23].

In a sample of patients, survival rates for patients with non-small cell lung cancer were higher than for those with small cell carcinoma. Small cell carcinoma has often metastasised at the time of diagnosis, but responds well to chemotherapy. Short-term survival has improved since the introduction of chemotherapy in the 1970s [2–6]. The proportion of patients with small cell lung cancer receiving chemotherapy was highest in France, The Netherlands and Switzerland, and lowest in the U.K. [17]. The only patients with non-small cell lung cancer who can be cured are those with localised disease, whose tumour can be resected. The proportion of patients receiving surgery was relatively high in Switzerland, France and The Netherlands, and low in the U.K. and Spain [17]. Despite improvement in detection by the increased use of flexible bronchoscopy, the prognosis for patients with non-small cell carcinoma has remained poor. In another study in the EURO CARE database, we found that survival rates differed according to histological subtype of non-small cell lung cancer: survival was lowest for patients with large-cell undifferentiated carcinoma and highest for those with squamous cell carcinoma or adenocarcinoma.

In conclusion, large variations in lung cancer survival rates existed between European countries. The most likely explanation for the differences is the variation in access to specialised care. Except for a slight improvement in short-term survival for patients with small cell lung cancer, survival has remained poor since 1978.

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APPENDIX

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