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Introduction: The EUROCARE II Study

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This introduction provides a general overview of the aims, methods and procedures used in the EUROCARE II study and the types of analyses presented in each article of this Special Issue of the *European Journal of Cancer*. The main aims of the EUROCARE II project are the updating of the survival database of the European Cancer Registries, the study of recent trends in relative survival rates and the interpretation of the survival differences observed both in time and across populations. Once having completed the preliminary stage of data checking, a total of 3 473 659 individual records from patients of all cancer sites, diagnosed between 1978 and 1989 and provided by 45 cancer registries in 17 European countries were accepted to build up the EUROCARE database. The quality of these data, in terms of the accuracy of the diagnosis and the validity of vital status assessment, was checked by indirect indicators, based on cross-validation analysis of consistency of the relevant variables. Statistical analysis was based on age-specific relative survival rates, computed for each cancer sites as the ratio of observed survival to the expected survival of the general population of the same area, gender and age, according to the Hakulinen method. An estimate of the European survival was computed as a weighted mean of the corresponding survival of the different countries, using as weights the expected yearly number of incident cases in each country. For comparison purposes, age-standardised survival was also calculated for Europe and for each country involved in the study. © **1998 Elsevier Science Ltd. All rights reserved.**

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INTRODUCTION

IN THE framework of the EUROCARE project, population-based survival data of cancer patients from a large number of European countries have been, for the first time, collected and analysed using a common methodology. Due to the high degree of standardisation of data collection, checking and analysis procedures achieved by this study, the wide inter-country differences of relative survival rates indicated for many cancers have to be considered genuine [1]. The subsequent development of the study, carried out in the so-called EUROCARE II project and continuing in the forthcoming EUROCARE III project, has two principal aims. The first is to update the survival database of European Cancer Registries to study variation in survival in more recent periods. The second is to interpret the survival differences observed in time and across populations in terms of earlier diagnosis, differences in efficacy of treatment, or interaction of both factors.

In the first stage of the EUROCARE Project, data were not collected for a number of cancer sites [2], where there was a possible lack of homogeneity among registries in disease definition and coding criteria. The experience gained in this early stage of the project, the process of increasing standardisation of practice among registries and the opportunity of examining in depth the data to facilitate the standardisation process, suggested the removal of such a limitation in subsequent stages of the study. A second change introduced in the EUROCARE II protocol was to collect data for all cancer patients, that is also for cases known to the registries only through death certificate only (DCO) or for cases detected at autopsy. This decision was made in the belief that detailed *ad*

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hoc analyses of data on DCO and autopsy cases could help in estimating their effect on survival statistics.

Survival data collected under the EUROCARE project now include patients for all cancer sites diagnosed from 1978 to 1989, a 12 year period. They were collected by a total of 45 cancer registries from 17 European countries, 12 and 5 more, respectively, than those studied during the first stage of the study. Extensive and detailed data will appear in a second EUROCARE monograph [3] in the IARC Scientific Publication series, which will be based on approximately 2 000 000 patients for 45 cancer sites, diagnosed between 1985 and 1989, and followed-up for at least 5 years. In this Special Issue of the *European Journal of Cancer*, selected aspects of the EUROCARE II study are presented and discussed for the most important cancer sites. This paper describes the methods and procedures used for the collection, verification and validation of the data. Further details, in particular for those aspects that remained unchanged, can be found both in the first [2] and in the second [3] EUROCARE monographs.

REGISTRIES AND PROPORTION OF POPULATION COVERED

Forty-five population-based cancer registries sent data for the second stage of the EUROCARE Project. They completely cover six countries (Denmark, Estonia, Finland, Iceland, Slovakia and Slovenia), and several major regions in the U.K. Forty-one of the areas involved in the study are covered by general registries, some of which did not contribute all data. Two areas are covered only by specialised registries: Côte d'Or (gastro-intestinal tract, haematological and gynaecological) and Girona (gynaecological). Two registries (Mainz, Germany and Piedmont) are childhood registries.

The list of cancer registries, the average population covered during the study period and the proportion of coverage of the corresponding national population are reported in Table 1. Due to the presence of specialised registries or of registries covering only a few sites, the proportion of coverage changes for some countries according to site. There was low coverage (around 6% or less) for France, The Netherlands (for most cancer sites), Poland and Germany. Better coverage (around 10% or more) was achieved for Italy, Spain, Sweden and Switzerland. There was high coverage for the U.K., which contributed more than half the number of cases in the whole database. Survival data for England and Scotland were analysed separately (no Welsh cancer registry participated in the study). For the sake of brevity, England and Scotland were considered in the analysis as individual countries. Total coverage (100%) was seen for Iceland, Finland, Denmark, Scotland, Slovenia, Slovakia and Estonia. Twenty-one registries from 13 countries with data covering at least the period 1979–1987 were considered for the analysis of time trends.

SITES

Survival data of patients for all malignant neoplasms were collected. With respect to the first stage of the EUROCARE project, 16 new cancer sites were added to the analysis. In this Special Issue, new data will be presented on cancers of the biliary tract, liver, soft tissues, melanoma, prostate, thyroid, multiple myeloma and Non-Hodgkin's lymphoma. The list of areas covered, the corresponding period and the number of patients considered in the present analysis, by cancer site, are reported in Table 2.

The general registries of Basel, Granada, Isère and Rotterdam contributed to a subset of cancer sites for which the follow-up was completed. The majority of registries contributed cases diagnosed during the whole study period, 1985–1989. The registries of Genoa, Isère, Latina, Parma, Romagna and Rotterdam only contributed cases for a 3-year period and the registries of Tyrol and Warsaw, for only a 2-year period.

INFORMATION COLLECTED, INCLUSION CRITERIA, DATA CHECK

For each patient, information was collected on gender, date of birth, date of diagnosis, date of end of follow-up, life status, tumour site in ICD-IX code, histological verification, morphology and behaviour codes. When available, also additional dates such as first hospital admission and first treatment, recorded as alternative index dates, and broad stage category were collected. For confidentiality reasons, only anonymous data were collected and the day of the month was omitted from all dates to prevent identification of patients. A registry-specific identification code for each record was requested to facilitate quality control and updating operations.

Only multiple tumours were a priori excluded at the data collection stage. Each registry was asked to send data on only the firstly diagnosed tumour for cases of multiple metachronous, and only on the most advanced one in cases of multiple synchronous tumours. Bilateral tumours of symmetric organs were treated as a single disease. No exclusion was made as regards cancer site or life status. Non malignant, autopsy and DCO cases were subsequently excluded at a later stage in the analysis. Due to the lack of standardised rules for inclusion of papillomas and non invasive carcinomas, tumours with non malignant behaviour were also included in the analysis of bladder cancer. Only cases with potential follow-up of at least five years were included in the analysis.

In order to evaluate the completeness of the survival data files, the number of cases collected from each registry was compared with the corresponding number of incident cases observed by the registry and published in the VII edition of *Cancer Incidence in Five Continents* [4]. The two datasets were not expected to coincide because, firstly, multiple tumours were excluded from survival data although they are considered in incidence statistics and, secondly, many registries contributed with cases diagnosed in a period that did not fully cover the incidence period published in *Cancer Incidence in Five Continents* [4]. For these registries, comparisons were made on the basis of an average number of cases per year. With these considerations, the number of cases in the survival analysis was consistent with the corresponding numbers published in *Cancer Incidence in Five Continents* [3, 4].

For Finnish and Swedish Cancer Registries, morphology was transformed from these registries' particular codes to the standard morphology codes. Since their morphology codes are generally less detailed than the standard classification, information on morphology for these two registries is, in some cases, not completely comparable with that of the other registries. Topography codes for extra-nodal lymphomas attributed to a specific organ site were recoded as lymphomas, where appropriate.

Table 1. *Population covered and coverage (%) of the national population of the participating registries (EUROCARE* II*)*

Country registry	National population (×1000)	Population covered (×1000)	Coverage %
Iceland	255	255	100
Finland	4986	4986	100
Sweden	8414	1474	17.5
South Sweden		1474	17.5
Denmark	5140	5140	100
England	52 300	25 262	48.3
East Anglia		2059	3.9
Mersey		2423	4.6
Oxford		2437	4.7
Thames		6564	12.6
Wessex		2935	5.6
West Midlands		5182	9.9
Yorkshire		3662	7.0
Scotland	5100	5100	100
The Netherlands	14 951	850–3066	5.7–20.8
Eindhoven		850	5.7
Rotterdam (only stomach, colon, rectum)		2216	14.8
France	56 735	1642–3139	2.9–5.5
Calvados		607	1.1
Côte d'Or (only GIT, haematological, gynaecological)		494	0.9
Doubs		490	0.9
Isère (only breast)		1003	1.8
Somme		545	1.0
Spain	38 959	3754–5030	9.6–12.9
Basque Countries		2139	5.5
Girona (only gynaecological)		509	1.3
Granada (only stomach, lung, breast)		767	2.0
Mallorca		577	1.5
Navarra		515	1.3
Tarragona		523	1.3
Italy	57 661	5542	9.7
Florence		1174	2.0
Genoa		725	1.3
Latina		447	0.8
Modena		260	0.5
Parma		396	0.7
Piedmont (regional childhood registry)*		4297	7.5
Ragusa		285	0.5
Romagna		432	0.7
Turin		1033	1.8
Varese		790	1.4
Switzerland	6712	794	11.8
Basel		424	6.3
Geneva		370	5.5
Germany	62 702	1051	1.7
Mainz (National childhood registry)*		62 702	100
Saarland		1051	1.7
Austria	8030	629	7.8
Tyrol		629	7.8
Slovenia	2000	2000	100
Slovakia	5325	5325	100
Poland	38 119	2366	6.2
Cracow		740	1.9
Warsaw		1626	4.3
Estonia	1571	1571	100

GIT, gastrointestinal tract. *Data from the childhood cancer registries were not entered in the calculation of the population covered.

Table 2. Cancer registries participating in the EUROCARE II *study: number of cases with period of diagnosis* 1985–1989, *by site*

Registry	Country	Period (year)	End of follow-up	Lip	Tongue	Salivary gland	Mouth	Oropharynx	Nasopharynx	Hypopharynx	Oesophagus	Stomach	Small intestine	Colon	Rectum
				ICD-9 code											
				140	141	142	143–145	146	147	148	150	151	152	153	154
Basel	CH	1985–1989	12/1994	–	34	–	35	28	–	23	70	301	–	547	356
Basque C.	E	1985–1989	12/1991	177	210	43	231	151	64	138	438	1682	31	1231	924
Calvados	F	1985–1989	06/1996	64	148	20	195	217	251	251	481	441	15	732	547
Côte d'Or	F	1985–1989	12/1995	–	–	–	–	–	–	–	192	351	24	782	461
Cracow	PL	1985–1989	09/1994	33	41	27	41	40	14	9	113	730	15	444	433
Denmark	DK	1985–1989	12/1994	629	323	231	684	360	116	173	1129	3549	284	9544	6239
Doubs	F	1985–1989	12/1994	7	98	17	104	148	13	124	200	302	20	586	432
E. Anglia	ENG	1985–1989	01/1995	161	104	60	139	59	30	82	913	1884	85	3387	2154
Eindhoven	NL	1985–1989	04/1994	49	46	27	66	26	12	19	105	777	29	1127	728
Estonia	EST	1985–1989	12/1994	124	87	52	154	121	36	61	262	2663	35	1240	1008
Finland	FIN	1985–1989	12/1995	703	237	177	262	74	66	93	956	4986	234	4251	2883
Florence	I	1985–1989	12/1994	58	97	47	144	73	55	52	243	3527	61	2506	1513
Geneva	CH	1985–1989	12/1994	23	68	15	65	69	8	52	105	288	20	616	298
Genoa	I	1986–1988	12/1994	12	54	19	73	39	29	27	95	739	13	937	486
Girona	E	1985–1989	11/1993	–	–	–	–	–	–	–	–	–	–	–	–
Granada	E	1985–1989	12/1995	–	–	–	–	–	–	–	–	370	–	–	–
Iceland	ICE	1985–1989	05/1996	23	6	2	20	3	4	1	48	258	16	286	91
Isère	I	1987–1989	05/1996	–	–	–	–	–	–	–	–	–	–	–	–
Latina	I	1985–1987	12/1995	22	16	16	12	10	3	1	20	226	6	211	145
Mainz chll	D	1985–1989	12/1994	1	1	2	6	2	22	0	0	2	0	1	0
Mallorca	E	1985–1989	12/1993	58	25	3	37	18	14	21	48	139	3	637	491
Mersey	ENG	1985–1989	04/1997	14	188	73	267	106	57	144	1287	2899	69	3882	2587
Modena	I	1985–1989	07/1995	3	16	9	21	14	7	18	33	499	13	681	386
Navarra	E	1985–1989	12/1994	143	37	17	72	33	19	20	138	819	12	582	404
Oxford	ENG	1985–1989	12/1994	145	142	84	159	68	49	62	840	2231	98	3801	2112
Parma	I	1985–1987	07/1995	5	30	11	34	18	10	19	50	749	16	532	288
Piedmont	I	1985–1989	12/1995	0	0	1	0	1	0	0	0	0	0	0	0
Ragusa	I	1985–1989	05/1995	55	14	15	14	3	13	2	18	291	7	221	187
Romagna	I	1986–1988	12/1993	4	18	17	17	9	16	7	32	854	15	549	264
Rotterdam	NL	1987–1989	12/1992	–	–	–	–	–	–	–	–	253	–	1387	728
Saarland	D	1985–1989	12/1992	53	183	50	219	118	34	96	269	1439	68	2103	1285
Scotland	SCO	1985–1989	12/1994	322	416	267	670	180	96	204	2746	5903	218	9184	4518
Slovakia	SK	1985–1989	12/1992	836	630	166	692	623	123	458	946	6080	148	4908	4785
Slovenia	SLO	1985–1989	12/1994	160	218	28	313	369	44	208	445	2661	32	1485	1672
Somme	F	1985–1989	12/1992	29	136	11	168	226	13	150	381	406	15	678	461
Sweden	S	1985–1989	12/1996	179	91	86	157	53	36	60	324	1366	152	2699	1561
Tarragona	E	1985–1989	01/1994	117	40	18	56	38	21	22	99	458	19	614	410
Thames	ENG	1985–1989	12/1994	112	335	225	421	199	123	207	3029	6412	186	10 478	5952
Turin	I	1985–1987	04/1993	57	69	29	89	74	18	18	124	793	28	1057	548
Tyrol	A	1988–1989	12/1995	2	16	8	44	12	5	12	40	439	9	345	210
Varese	I	1985–1989	05/1997	28	92	34	92	108	29	60	215	1333	26	1333	670
Warsaw	PL	1988–1989	06/1997	27	48	7	19	57	10	8	124	570	9	559	420
Wessex	ENG	1985–1989	12/1995	84	189	112	199	65	56	85	1656	3082	119	6063	3010
W. Midlands	ENG	1985–1989	12/1995	62	303	145	404	167	90	187	2336	6142	244	8406	5294
Yorkshire	ENG	1985–1989	12/1995	92	200	101	323	93	44	133	1466	3976	144	5530	3787

(continued)

Table 2. (continued)

Registry	Country	Liver	Biliary tract	Pancreas	Peritoneum	Nose, sinuses, etc.	Larynx	Bronchus, lung	Pleura	Bone	Connective tissue	Melanoma of skin	Female breast
		ICD-9 code											
		155	156	157	158	160	161	162	163	170	171	172	174
Basel	CH	112	72	162	–	–	67	843	–	–	–	253	984
Basque C.	E	447	300	472	31	52	772	2266	26	59	119	269	2053
Calvados	F	165	81	168	5	37	230	942	33	28	56	209	1414
Côte d'Or	F	149	92	191	6	–	–	–	–	–	–	–	1104
Cracow	PL	224	260	368	26	23	228	1853	15	28	50	162	1111
Denmark	DK	2042	1110	3261	520	276	1225	15 422	428	350	536	3236	14 346
Doubs	F	101	59	107	19	8	189	845	23	16	42	152	977
E. Anglia	ENG	119	293	1128	58	86	301	6428	123	65	218	830	5447
Eindhoven	NL	44	182	294	28	24	180	2333	29	34	81	288	2119
Estonia	EST	279	176	817	32	49	323	3352	35	66	169	337	1955
Finland	FIN	1324	1300	3070	37	135	580	9994	247	184	551	2143	10 684
Florence	I	548	403	738	59	42	719	3700	40	79	126	421	3362
Geneva	CH	136	69	232	17	7	123	884	16	15	47	273	1139
Genoa	I	264	189	314	21	21	261	1811	110	19	51	141	1382
Girona	E	–	–	–	–	–	–	–	–	–	–	–	730
Granada	E	–	–	–	–	–	–	604	–	–	–	–	496
Iceland	ICE	36	28	126	11	13	19	407	7	12	20	50	521
Isère	I	–	–	–	–	–	–	–	–	–	–	–	1561
Latina	I	75	52	65	6	3	64	489	4	13	39	41	361
Mainz chll	D	77	1	1	31	17	2	7	0	333	253	7	0
Mallorca	E	81	60	86	9	5	92	501	6	6	18	65	414
Mersey	ENG	291	275	1516	57	87	541	10 549	236	81	214	579	6107
Modena	I	156	62	177	8	3	134	840	10	6	29	82	661
Navarra	E	247	195	208	30	13	272	779	21	29	38	118	886
Oxford	ENG	226	222	1349	61	93	353	7413	135	104	246	993	6212
Parma	I	157	74	183	15	9	149	780	19	4	37	73	739
Piedmont	I	6	0	1	3	0	0	2	0	40	29	0	0
Ragusa	I	143	95	125	7	4	76	400	5	25	14	55	468
Romagna	I	115	65	176	20	6	129	939	12	14	34	90	731
Rotterdam	NL	–	–	–	–	–	–	–	–	–	–	–	–
Saarland	D	245	533	616	28	21	321	3111	40	50	134	459	2668
Scotland	SCO	798	669	2976	160	141	1148	22 298	529	200	466	2162	12 571
Slovakia	SK	1275	1793	2512	206	137	1557	12 681	81	235	483	1272	6018
Slovenia	SLO	197	506	776	53	71	495	4016	69	73	131	533	3160
Somme	F	109	90	166	7	29	231	1067	31	17	35	103	1090
Sweden	S	442	561	1048	31	60	223	2439	98	67	211	1225	3952
Tarragona	E	138	109	165	29	13	211	859	9	35	71	102	917
Thames	ENG	785	705	4225	163	231	1060	23 531	517	331	519	2207	17 278
Turin	I	357	173	337	39	25	335	1827	41	36	63	174	1683
Tyrol	A	50	72	140	8	8	62	584	6	12	47	211	583
Varese	I	411	224	410	32	27	337	2260	24	55	63	226	2210
Warsaw	PL	153	344	344	16	6	203	1654	12	34	59	152	983
Wessex	ENG	340	304	1942	88	124	518	10 534	367	153	373	1516	8638
W. Midlands	ENG	446	730	2771	106	171	926	17 499	186	192	480	1602	12 426
Yorkshire	ENG	411	400	2018	70	107	724	13 264	259	132	380	1103	8644

(continued)

Table 2. (continued)

Registry	Country	Male breast	Cervix uteri	Corpus uteri	Ovary	Other unspecified female genital	Prostate	Testes	Penis	Bladder	Kidney and other urinary	Eye	Brain
		ICD-9 code											
		175	180	182	183	184	185	186	187	188	189	190	191
Basel	CH	–	77	221	174	–	669	86	–	200	205	–	106
Basque C.	E	18	239	394	277	117	857	59	56	1264	449	45	385
Calvados	F	16	498	229	197	50	841	57	20	417	243	24	107
Côte d'Or	F	–	154	182	178	14	–	–	–	–	–	–	–
Cracow	PL	8	486	303	343	61	242	50	10	275	301	26	182
Denmark	DK	87	2791	3093	2937	549	6940	1269	214	7485	3153	293	2423
Doubs	F	4	134	147	142	41	558	50	15	233	176	14	96
E. Anglia	ENG	46	768	867	1019	207	2951	277	67	1924	721	67	690
Eindhoven	NL	9	166	300	261	44	819	86	26	549	344	19	156
Estonia	EST	14	806	763	764	139	751	60	35	569	665	81	367
Finland	FIN	42	686	2330	1911	346	5724	296	68	2645	2849	218	1396
Florence	I	32	327	670	473	137	1352	117	41	2154	766	42	471
Geneva	CH	2	467	228	187	49	555	72	19	405	208	18	115
Genoa	I	8	168	216	215	48	460	33	15	680	253	7	166
Girona	E	–	99	171	121	28	–	–	–	–	–	–	–
Granada	E	–	–	–	–	–	–	–	–	–	–	–	–
Iceland	ICE	3	65	78	115	9	459	36	7	182	152	12	94
Isère	I	–	–	–	–	–	–	–	–	–	–	–	–
Latina	I	5	79	86	51	20	109	11	6	212	62	9	65
Mainz chll	D	0	1	0	31	8	6	62	1	11	391	207	772
Mallorca	E	2	310	109	54	35	240	5	10	306	75	11	89
Mersey	ENG	30	1323	872	1129	234	2488	316	103	2707	814	66	722
Modena	I	3	86	131	129	35	282	19	4	385	169	14	73
Navarra	E	6	156	210	157	51	593	21	22	531	198	17	226
Oxford	ENG	48	851	1021	1171	222	2820	355	92	2468	834	67	880
Parma	I	2	108	152	137	30	248	15	3	302	161	9	69
Piedmont	I	0	0	0	4	0	1	3	2	1	16	8	104
Ragusa	I	5	101	145	76	15	179	10	2	180	59	2	82
Romagna	I	8	105	143	113	37	295	26	11	419	206	21	117
Rotterdam	NL	–	–	–	–	–	–	–	–	–	–	–	–
Saarland	D	15	434	658	460	140	1117	176	25	1055	618	26	318
Scotland	SCO	60	2109	1569	2547	472	5606	700	192	5764	2090	310	1420
Slovakia	SK	67	2462	2497	1690	368	3201	584	143	2738	2103	239	1260
Slovenia	SLO	22	807	933	714	162	1122	200	42	758	553	70	372
Somme	F	11	381	197	191	54	771	53	14	511	195	26	130
Sweden	S	33	438	715	864	134	3896	179	53	1580	1008	77	527
Tarragona	E	10	159	233	141	51	441	27	20	575	121	13	156
Thames	ENG	143	2291	2550	3522	615	7712	823	191	7085	2174	308	1976
Turin	I	18	213	298	244	50	506	45	21	912	305	21	216
Tyrol	A	1	175	121	138	25	413	39	5	295	201	15	64
Varese	I	9	196	438	299	59	716	95	24	1001	458	16	243
Warsaw	PL	9	354	307	297	57	227	76	10	309	369	14	156
Wessex	ENG	66	1292	1202	1590	336	4499	413	117	3792	1215	147	1009
W. Midlands	ENG	91	2247	1829	2544	493	5432	441	186	4919	1723	148	1350
Yorkshire	ENG	65	1862	1170	1578	396	3954	402	132	3802	1262	143	1036

(continued)

Table 2. (continued)

Registry	Country	Other nervous	Thyroid	Other endocrine	Other ill-defined sites	Secondary unspecified	Non-Hodgkin's	Hodgkin's	Multiple myeloma	Acute lymphoid leukaemia	Chronic lymphoid leukaemia	Acute myeloid leukaemia	Chronic myeloid leukaemia
		ICD-9 code											
		192	193	194	195	196–199	200–202	201	203	204.0	204.1	205.0	205.1
Basel	CH	–	–	–	–	–	229	51	54	11	72	46	23
Basque C.	E	5	120	16	122	4	452	169	204	87	130	77	59
Calvados	F	2	96	12	14	183	298	76	90	24	63	24	34
Côte d'Or	F	–	–	–	–	–	247	63	89	33	127	94	118
Cracow	PL	10	75	8	100	234	154	93	80	46	48	47	20
Denmark	DK	1014	489	121	674	1297	2906	619	1239	310	1273	974	342
Doubs	F	6	67	11	6	23	227	54	78	29	65	72	26
E. Anglia	ENG	23	165	43	90	0	1295	85	542	89	307	292	133
Eindhoven	NL	9	96	17	13	703	401	92	152	45	92	81	46
Estonia	EST	21	195	24	8	370	294	192	149	59	306	100	83
Finland	FIN	38	1202	116	714	1023	2479	562	1213	353	649	564	219
Florence	I	15	269	41	50	793	649	222	369	64	200	135	111
Geneva	CH	9	66	6	44	169	258	60	82	23	65	42	43
Genoa	I	10	111	15	50	328	280	81	148	29	82	64	43
Girona	E	–	–	–	–	–	1	–	–	–	–	–	–
Granada	E	–	–	–	–	–	–	–	–	–	–	–	–
Iceland	ICE	39	95	9	1	109	81	18	58	15	24	27	10
Isère	I	–	–	–	–	–	1	–	–	–	–	–	–
Latina	I	1	22	10	11	78	103	42	29	17	32	36	14
Mainz chll	D	98	16	190	155	9	415	234	0	1604	0	257	56
Mallorca	E	1	25	5	12	200	112	26	48	19	25	31	13
Mersey	ENG	113	154	47	99	114	1266	274	503	127	271	313	142
Modena	I	0	58	21	7	140	245	30	85	6	56	25	23
Navarra	E	4	144	11	35	210	212	71	85	19	73	46	30
Oxford	ENG	73	242	77	7	2470	1255	332	583	151	250	311	180
Parma	I	5	72	3	15	163	146	56	85	16	36	46	20
Piedmont	I	11	3	25	0	0	36	18	0	113	0	21	5
Ragusa	I	3	28	4	6	84	83	24	69	25	18	27	21
Romagna	I	7	89	4	10	120	256	45	83	19	67	45	32
Rotterdam	NL	–	–	–	–	–	–	–	–	–	–	–	–
Saarland	D	52	200	48	53	1013	429	131	209	61	171	115	102
Scotland	SCO	34	481	113	137	5447	2985	652	1236	285	764	685	277
Slovakia	SK	85	564	107	574	1769	1302	538	761	314	912	443	400
Slovenia	SLO	34	247	39	173	1231	573	167	225	106	328	148	125
Somme	F	5	68	12	38	324	239	66	90	22	137	60	41
Sweden	S	360	547	549	253	748	968	163	469	93	341	204	78
Tarragona	E	5	72	14	56	432	165	57	112	30	77	42	40
Thames	ENG	91	513	154	193	7266	3888	813	1737	315	1051	945	426
Turin	I	8	108	19	71	388	288	97	115	33	46	71	38
Tyrol	A	1	77	14	10	105	140	28	53	18	52	32	17
Varese	I	11	200	18	13	435	589	150	166	50	119	112	83
Warsaw	PL	13	63	16	53	1	198	69	80	26	39	52	27
Wessex	ENG	53	276	77	269	3010	2166	379	1025	211	608	509	324
W. Midlands	ENG	34	427	151	4	6224	2250	576	1168	287	729	654	341
Yorkshire	ENG	18	271	61	214	4718	1836	449	951	189	664	454	276

After this preliminary stage, all data underwent validity and consistency verification. Individual records with a field completed with invalid code values, or reporting impossible or even improbable sex–site–morphology combinations were sent back to the registries for checking and, when appropriate and possible, for correction. Data reviewed by registry specialists were submitted again to the same validation criteria. Records still presenting invalid fields were excluded from the database. However, for records with unusual sex–site–morphology combinations, the final judgement of the responsible registry was accepted. Table 3 reports the results of the validation procedure, which was applied to whole dataset sent by the registries.

A total of 41 515 records were sent back for control to the registries, representing 1.2% of those received. This percentage varied across registries from 0–10%. For 18 268 of these records, it was possible to recover the correct information and to include them in the database, but the other 23 229 records (0.66%) were rejected. After this stage, the EUROCARE database is based on a total of 3 473 659 individual records. The corresponding incidence period varies according to the registries, and is also reported in Table 3.

Table 3. *Process of data validation and consistency check: period and number of records submitted, corrected and accepted (EUROCARE* II*)*

Registry	Period	Received	Checked	Rejected	Accepted
Basel	1981–1988	11 946	201	0	11 946
Basque Country	1986–1988	19 448	56	57	19 391
Calvados*	1978–1989	26 641	920	800	25 841
Côte d'Or*	1976–1995	15 197	456	112	15 085
Cracow*	1978–1992	30 570	1617	805	29 765
Denmark*	1978–1994	424 451	2633	6	42 445
Doubs*	1978–1992	24 993	546	454	24 539
East Anglia*	1979–1992	134 482	316	204	134 278
Eindhoven*	1978–1992	40 187	2455	2449	37 738
Estonia*	1978–1992	58 624	85	0	58 624
Finland*	1978–1994	246 203	209	82	246 121
Florence	1985–1989	29 157	1311	0	29 157
Geneva*	1978–1989	21 599	5	0	21 599
Genoa	1986–1988	12 030	864	1	12 029
Girona	1980–1989	2073	2	0	2073
Granada	1985–1989	1472	2	2	1470
Iceland	1955–1992	20 363	4	0	20 363
Isère	1987–1989	1563	1	1	1562
Latina	1983–1987	5600	199	1	5599
Mainz	1980–1992	13 962	268	259	13 703
Mallorca	1982–1990	9271	247	181	9090
Mersey	1985–1989	62 707	33	12	62695
Modena	1985–1990	8469	556	29	8440
Navarra	1985–1989	9691	48	27	9664
Oxford*	1979–1990	132 358	352	202	132 156
Parma*	1978–1987	18 668	293	4	18 664
Piedmont	1975–1989	1596	500	6	1590
Ragusa	1981–1989	7591	445	8	7583
Romagna	1986–1988	7721	330	0	7721
Rotterdam	1987–1980	3012	3	0	3012
Saarland*	1970–1992	109 815	13	2	109 813
Scotland*	1978–1993	337 902	1223	331	337 571
Slovakia	1972–1991	214 388	3208	168	214 220
Slovenia	1985–1991	39 320	788	90	39 230
Somme	1982–1989	15 946	949	277	15 669
South Sweden*	1978–1995	118 488	922	33	118 455
Tarragona	1985–1992	16 597	1708	372	16 225
Thames*	1978–1992	414 351	6983	6799	407 552
Turin	1985–1987	13 948	413	111	13 837
Tyrol	1988–1992	13 903	0	0	13 903
Varese*	1976–1992	51 401	538	52	51 349
Warsaw†	1988–1989	9673	983	983	8690
Warsaw†	1989–1993	31 081	2389	2346	28 735
Wessex*	1979–1992	214 755	2053	2053	212 702
West Midlands*	1978–1989	272 789	4003	3905	268 884
Yorkshire*	1978–1990	220 886	386	5	220 881
Total		3 496 888	41 515	23 229	3 473 659

*Registries considered in the analysis of temporal trends in survival. †The Warsaw Cancer Registry has contributed with two partially overlapping datasets that have been checked separately.

Table 4. *Five-year relative survival for cancers with high lethality*, 1985–1989 *(EUROCARE* II*)*

Country	AML	Pleura	Lung	Pancreas	Biliary tract	Liver	Oesophagus
Austria*	25	0	12	9	20	11	14
Denmark	11	2	6	2	5	1	5
England	11	5	7	3	11	4	9
Estonia	9	11	8	1	4	2	3
Finland	14	7	10	3	8	4	8
France*	18	12	14	8	16	8	9
Germany*	13	8	11	4	16	6	8
Iceland	5	0	12	3	19	9	25
Italy*	9	3	10	4	9	4	8
The Netherlands*	9	0	13	2	8	0	12
Poland*	1	14	8	4	6	3	3
Scotland	9	2	6	4	8	2	7
Slovakia	6	8	13	8	11	5	8
Slovenia	7	6	8	3	5	0	3
Spain*	15	16	13	5	17	10	9
Sweden*	10	8	10	3	8	4	14
Switzerland*	13	0	12	2	12	3	15
Europe	12	7	10	4	12	5	8

AML, acute myeloid leukaemia. *< 20% of the national population covered.

INDICATORS OF DATA QUALITY

The quality of population-based survival data mainly concerns the accuracy of the diagnosis and the validity of vital status assessment. No independent source is generally available in this type of study to give a direct external check of the quality of such information. Therefore, only indirect indicators are presented, based on cross-validation analysis of consistency of the relevant variables. Some cancers are known to have a very poor prognosis, with little room for therapeutic efforts. Unexpectedly high survival for these cancers indicates, therefore, inaccurate diagnosis, or deaths not known to the registry, or both. Table 4 reports the five-year relative survival rates estimated, by country, in both sexes and all ages, for the seven most fatal cancer sites. Outlier values were found for acute myeloid leukaemia, pancreas, biliary tract and liver cancers in Austria; for oesophagus and biliary tract in Iceland and for pleura and biliary tract in Spain. All these countries have very small populations covered by the cancer registries, so survival rates are, therefore, characterised by large random variability. There may be some concern about the data of the Austrian registry of Tyrol, presenting surprisingly high survival rates for four of the seven highly lethal cancer sites.

Table 5 reports the percentage of deaths occurring within one month from diagnosis, by site and registry. The proportion of short-term survivors was very variable between sites, being expectedly higher for very fatal cancers, such as those of the pancreas, oesophagus, biliary tract and liver. For each given site, the proportion of very early deaths was also variable across registries. A high proportion was generally observed in Eastern European and U.K. registries. This finding is consistent with the low survival estimated in these areas and can be explained by a high proportion of cases diagnosed at a very advanced stage. In other cases, a high proportion of deaths in the first month was observed in registries (Doubs, Tirol, Turin) from countries with average to high levels of 5-year survival rates. These cases can be better explained by difficulties in obtaining information on incident cases, which may result in a delayed date of diagnosis, or by some other systematic factor affecting the definition or the coding of the date of diagnosis.

STATISTICAL ANALYSES AND TABLES

The EUROCARE database, after the quality control and editing phases described above, was systematically analysed to produce relative survival figures, for 17 countries (including England and Scotland as separate countries), for each gender and for five age groups (15–44, 45–54, 55–64, 65–74, 75–99 years), for each organ defined by ICD 3-digit codes for solid tumours (except nonmelanoma skin cancer) and 4-digit codes for leukaemia, as well as for all sites combined. For each organ site, basic analysis was carried out on survival data of patients diagnosed from 1985 to 1989. Survival trends were also studied, dividing the total calendar period covered by the EUROCARE study into four sub-periods (1978–1980, 1981–1983, 1984–1986 and 1987–1989). Relative survival (1-, 3- and 5-year) was calculated as the ratio of observed survival to the expected survival of the general population of each registry of the same gender and age [5].

As survival is usually heavily dependent on the age of patients and the age-distribution of patients may be different between countries, to examine intercountry variation, direct age-standardised relative survival rates were calculated, using the age-distribution of cases of the overall European sample as the standard. To facilitate between-gender comparisons, the same standard was used for men and women. The confidence interval of age-standardised rates was also provided, calculated by the delta method from standard errors of age-specific rates and using the normal approximation in the logarithmic scale. For less frequent tumours and for countries represented by few cases, it was sometimes impossible to calculate age-standardised survival rates due to lack of data in some age groups. Also, a small number of cases gave, in some circumstances, very unstable estimates. Therefore, when considering age-standardised rates, it is recommended that close attention is paid to the confidence intervals (CIs) or to the number of cases in each age group.

Table 5. *Percentage of deaths within 1 month of diagnosis by cancer,* 1985–1989 *(EUROCARE* II*)*

Registry	Country	Period (year)	End of follow-up	Lip	Tongue	Salivary gland	Mouth	Oropharynx	Nasopharynx	Hypopharynx	Oesophagus	Stomach	Small intestine	Colon	Rectum
				ICD-9 code											
				140	141	142	143–145	146	147	148	150	151	152	153	154
Basel	CH	1985–1989	12/1994	–	0.0	–	0.0	0.0	–	4.3	9.1	6.9	–	3.7	3.2
Basque C.	E	1985–1989	12/1991	0.6	2.0	0.0	0.4	0.7	4.8	1.5	5.7	9.1	11.1	9.1	4.3
Calvados	F	1985–1989	06/1996	1.6	0.7	0.0	1.5	0.9	8.3	1.2	2.9	6.1	6.7	6.0	2.6
Côte d'Or	F	1985–1989	12/1995	–	–	–	–	–	–	–	4.2	10.9	12.5	4.0	3.0
Cracow	PL	1985–1989	09/1994	0.0	7.7	11.1	7.3	12.8	0.0	25.0	23.1	27.4	15.4	23.2	14.3
Denmark	DK	1985–1989	12/1994	0.3	3.4	0.9	1.9	1.4	3.4	3.5	9.9	9.9	9.2	7.4	4.9
Doubs	F	1985–1989	12/1994	0.0	13.3	17.6	8.6	2.7	15.4	4.8	5.5	8.6	20.0	15.2	10.9
E. Anglia	ENG	1985–1989	01/1995	2.5	1.0	6.7	2.9	5.1	10.0	3.7	12.5	15.5	9.5	10.0	6.3
Eindhoven	NL	1985–1989	04/1994	0.0	2.2	0.0	0.0	3.8	0.0	5.3	3.8	6.9	6.9	4.9	2.6
Estonia	EST	1985–1989	12/1994	0.0	1.2	0.0	1.3	0.8	0.0	0.0	5.8	7.7	23.1	11.5	6.2
Finland	FIN	1985–1989	12/1995	0.4	2.1	0.0	0.7	1.4	0.0	0.0	6.3	7.5	5.9	5.8	3.3
Florence	I	1985–1989	12/1994	0.0	2.1	2.3	1.4	0.0	1.9	0.0	6.8	6.6	5.1	4.1	3.4
Geneva	CH	1985–1989	12/1994	4.3	0.0	0.0	0.0	0.0	0.0	3.9	4.9	4.7	5.3	4.4	2.1
Genoa	I	1986–1988	12/1994	0.0	5.7	0.0	2.7	0.0	3.6	0.0	2.2	7.2	0.0	4.2	3.7
Girona	E	1985–1989	11/1993	–	–	–	–	–	–	–	–	–	–	–	–
Granada	E	1985–1989	12/1995	–	–	–	–	–	–	–	–	8.2	–	–	–
Iceland	ICE	1985–1989	05/1996	0.0	0.0	0.0	5.0	0.0	0.0	0.0	4.3	6.0	0.0	5.4	2.2
Isère	I	1987–1989	05/1996	–	–	–	–	–	–	–	–	–	–	–	–
Latina	I	1985–1987	12/1995	4.5	0.0	0.0	0.0	0.0	0.0	0.0	5.0	6.6	0.0	7.1	2.8
Mainz chll	D	1985–1989	12/1994	0.0	0.0	0.0	0.0	0.0	0.0	–	–	0.0	–	0.0	–
Mallorca	E	1985–1989	12/1993	0.0	0.0	0.0	0.0	0.0	0.0	4.8	2.3	7.7	0.0	8.1	6.4
Mersey	ENG	1985–1989	04/1997	7.1	1.1	2.9	1.2	1.0	1.8	5.6	12.0	13.5	9.2	9.1	6.5
Modena	I	1985–1989	07/1995	0.0	0.0	0.0	5.0	0.0	0.0	0.0	9.7	9.3	15.4	6.2	3.1
Navarra	E	1985–1989	12/1994	0.7	0.0	7.1	0.0	3.1	0.0	0.0	5.6	3.0	8.3	3.8	4.7
Oxford	ENG	1985–1989	12/1994	0.0	2.1	3.6	2.5	1.5	2.0	4.9	13.5	14.2	14.6	10.5	7.1
Parma	I	1985–1987	07/1995	0.0	0.0	0.0	0.0	0.0	0.0	10.5	6.2	6.9	0.0	5.0	3.2
Piedmont	I	1985–1989	12/1995	–	–	0.0	–	0.0	–	–	–	–	–	–	–
Ragusa	I	1985–1989	05/1995	0.0	7.1	0.0	0.0	0.0	0.0	0.0	5.6	7.3	14.3	7.2	5.3
Romagna	I	1986–1988	12/1993	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.7	4.7	7.7	1.7	3.1
Rotterdam	NL	1987–1989	12/1992	–	–	–	–	–	–	–	–	6.8	–	5.1	3.5
Saarland	D	1985–1989	12/1992	0.0	0.6	2.0	0.5	0.9	0.0	0.0	7.0	8.4	18.2	5.3	2.8
Scotland	SCO	1985–1989	12/1994	0.3	2.0	1.9	1.8	2.2	3.2	3.0	11.7	15.7	10.9	9.6	7.6
Slovakia	SK	1985–1989	12/1992	1.5	1.7	3.9	2.2	3.4	5.1	4.3	11.4	12.1	14.3	12.2	7.6
Slovenia	SLO	1985–1989	12/1994	0.6	2.8	14.3	1.3	0.8	2.3	3.9	10.4	11.0	7.1	10.9	6.0
Somme	F	1985–1989	12/1992	0.0	2.9	0.0	0.6	0.9	0.0	2.0	7.6	9.9	0.0	6.2	3.3
Sweden	S	1985–1989	12/1996	0.6	0.0	1.2	1.3	0.0	0.0	0.0	3.0	4.5	4.0	3.7	2.3
Tarragona	E	1985–1989	01/1994	0.0	2.6	5.6	1.7	0.0	0.0	0.0	12.2	9.4	5.6	6.5	4.2
Thames	ENG	1985–1989	12/1994	0.9	2.3	1.5	2.0	3.2	4.6	4.6	12.2	16.8	13.7	10.5	6.7
Turin	I	1985–1987	04/1993	0.0	2.9	7.7	3.4	5.6	0.0	0.0	23.1	23.9	14.3	16.0	11.5
Tyrol	A	1988–1989	12/1995	0.0	0.0	0.0	0.0	25.0	0.0	0.0	12.5	11.6	12.5	9.1	9.2
Varese	I	1985–1989	05/1997	3.6	2.2	5.9	0.0	0.9	0.0	1.7	7.0	4.7	3.8	3.6	2.1
Warsaw	PL	1989–1989	06/1997	7.4	10.4	0.0	0.0	1.8	0.0	25.0	12.9	16.5	12.5	15.3	7.7
Wessex	ENG	1985–1989	12/1995	2.4	3.3	3.6	4.3	6.5	1.8	4.9	10.0	13.0	12.5	9.0	6.4
W. Midlands	ENG	1985–1989	12/1995	1.6	3.0	2.1	1.2	2.4	4.4	8.0	14.9	19.3	15.8	12.6	8.4
Yorkshire	ENG	1985–1989	12/1995	1.1	3.1	2.0	1.9	5.6	2.3	4.5	16.2	15.2	15.3	9.8	6.7

(continued)

Table 5. (continued)

Registry	Country	Liver	Biliary tract	Pancreas	Peritoneum	Nose, sinuses, etc.	Larynx	Bronchus, lung	Pleura	Bone	Connective tissue	Melanoma of skin	Female breast
		ICD-9 code											
		155	156	157	158	160	161	162	163	170	171	172	174
Basel	CH	24.1	8.8	11.5	–	–	0.0	8.6	–	–	–	0.0	0.4
Basque C.	E	39.5	15.1	24.4	15.4	6.1	1.0	11.0	13.0	0.0	2.6	0.8	0.9
Calvados	F	17.3	16.0	12.7	0.0	0.0	0.4	5.4	6.1	0.0	3.6	0.0	0.4
Côte d'Or	F	18.7	19.6	16.2	0.0	–	–	–	–	–	–	–	2.4
Cracow	PL	38.5	30.8	38.9	30.4	0.0	5.5	16.7	7.1	19.0	10.6	4.5	4.8
Denmark	DK	21.6	13.7	16.2	12.9	1.4	1.1	12.6	9.6	4.0	0.9	0.3	1.7
Doubs	F	23.8	18.6	23.4	15.8	0.0	3.2	5.4	26.1	0.0	19.0	12.5	6.1
E. Anglia	ENG	18.6	12.3	20.1	14.3	1.2	3.3	13.1	5.3	1.6	4.1	1.8	2.2
Eindhoven	NL	11.4	11.0	11.2	7.1	0.0	0.6	5.4	0.0	0.0	0.0	0.3	1.6
Estonia	EST	25.9	20.3	17.0	9.7	2.1	0.3	8.2	8.8	8.2	4.3	0.6	1.3
Finland	FIN	19.3	14.1	14.2	17.2	1.5	1.2	7.1	5.5	1.1	4.2	0.2	0.6
Florence	I	18.5	8.0	7.0	11.1	2.4	2.6	6.0	0.0	8.2	2.4	0.7	1.2
Geneva	CH	13.6	9.4	8.3	0.0	0.0	0.0	4.7	6.2	0.0	0.0	0.0	0.5
Genoa	I	11.6	6.7	8.0	0.0	0.0	0.4	6.2	2.9	5.6	0.0	0.7	0.7
Girona	E	–	–	–	–	–	–	–	–	–	–	–	0.1
Granada	E	–	–	–	–	–	–	6.7	–	–	–	–	1.1
Iceland	ICE	9.1	14.3	20.3	18.2	0.0	0.0	5.4	0.0	0.0	5.0	0.0	0.6
Isère	I	–	–	–	–	–	–	–	–	–	–	–	5.4
Latina	I	16.2	15.4	12.5	0.0	0.0	3.1	6.3	25.0	0.0	0.0	0.0	0.6
Mainz chll	D	1.3	0.0	0.0	6.5	0.0	0.0	0.0	–	0.9	1.2	14.3	–
Mallorca	E	27.9	17.9	29.9	12.5	0.0	1.1	8.7	0.0	0.0	5.6	1.5	1.2
Mersey	ENG	23.9	15.8	20.3	6.4	0.0	1.9	13.7	5.2	2.5	2.9	0.5	2.6
Modena	I	18.4	12.1	15.3	0.0	0.0	2.4	6.2	10.0	0.0	3.6	1.2	1.1
Navarra	E	18.6	9.8	7.9	12.0	0.0	0.4	6.6	0.0	4.3	0.0	0.0	0.4
Oxford	ENG	26.8	16.8	20.2	20.3	4.3	2.0	16.2	11.9	4.9	4.9	0.8	2.2
Parma	I	17.4	12.5	9.4	15.4	0.0	0.0	8.2	0.0	0.0	0.0	0.0	0.4
Piedmont	I	0.0	–	0.0	0.0	–	–	0.0	–	0.0	3.4	–	–
Ragusa	I	14.8	6.5	8.2	0.0	0.0	0.0	8.0	0.0	4.0	0.0	0.0	0.6
Romagna	I	8.4	4.7	5.5	10.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.3
Rotterdam	NL	–	–	–	–	–	–	–	–	–	–	–	–
Saarland	D	19.6	9.7	14.9	8.3	0.0	1.3	9.5	5.6	0.0	2.4	0.7	0.9
Scotland	SCO	29.8	23.0	23.6	16.4	2.1	2.2	16.3	12.0	5.1	3.3	0.5	2.5
Slovakia	SK	31.2	18.7	17.1	12.5	3.1	2.7	10.9	18.7	6.0	3.1	1.9	2.4
Slovenia	SLO	26.0	17.7	18.9	4.4	2.9	0.4	7.6	11.3	1.5	2.3	0.4	1.4
Somme	F	20.2	16.7	21.7	14.3	0.0	2.6	6.6	9.7	5.9	8.6	0.0	0.9
Sweden	S	17.7	13.9	11.2	3.7	0.0	0.5	8.1	3.3	0.0	1.9	0.3	0.5
Tarragona	E	19.2	24.5	15.4	21.4	7.7	1.5	9.1	11.1	3.3	2.9	2.0	1.1
Thames	ENG	33.2	23.7	23.7	14.4	2.9	2.0	16.1	9.9	4.3	5.1	0.9	2.2
Turin	I	51.9	42.8	35.4	18.4	4.2	3.3	23.1	21.1	8.8	4.9	1.2	1.7
Tyrol	A	31.2	14.5	17.0	25.0	25.0	9.4	14.0	20.0	25.0	2.3	0.5	5.8
Varese	I	11.7	9.4	6.6	6.2	0.0	1.2	4.9	0.0	1.8	3.2	1.3	1.2
Warsaw	PL	31.7	19.3	19.2	12.5	0.0	1.5	13.5	0.0	5.9	3.4	3.9	2.9
Wessex	ENG	35.0	15.3	19.9	18.8	2.6	3.1	17.1	19.8	7.4	9.4	0.7	2.9
W. Midlands	ENG	31.7	21.8	25.6	10.6	4.1	3.0	19.4	11.1	2.1	4.0	0.2	2.9
Yorkshire	ENG	25.1	14.6	19.6	8.8	0.9	2.0	16.5	9.8	2.3	2.2	0.6	2.0

(continued)

Table 5. *(continued)*

Registry	Country	Male breast	Cervix uteri	Corpus uteri	Ovary	Other unspecified female genital	Prostate	Testes	Penis	Bladder	Kidney and other urinary	Eye	Brain
		ICD-9 code											
		175	180	182	183	184	185	186	187	188	189	190	191
Basel	CH	–	0.0	1.3	4.1	–	1.1	0.0	–	2.6	6.1	–	3.9
Basque C.	E	0.0	1.3	0.8	5.4	1.0	3.7	3.4	0.0	2.5	5.5	0.0	13.4
Calvados	F	0.0	0.2	0.4	4.1	2.0	1.5	0.0	0.0	0.5	3.3	0.0	1.9
Côte d'Or	F	–	0.0	1.6	7.9	0.0	–	–	–	–	–	–	–
Cracow	PL	14.3	4.0	3.4	13.5	15.4	19.0	4.0	11.1	14.8	12.7	3.8	22.0
Denmark	DK	0.0	1.5	1.2	5.3	3.1	3.2	0.6	3.5	2.1	6.3	0.0	7.7
Doubs	F	0.0	3.7	12.9	9.2	24.4	17.2	10.0	13.5	9.9	19.3	21.4	10.4
E. Anglia	ENG	0.0	2.1	3.9	7.7	3.4	3.5	1.8	1.5	3.9	7.0	6.1	8.5
Eindhoven	NL	0.0	0.0	0.7	4.6	2.3	2.1	0.0	0.0	1.1	3.8	0.0	5.1
Estonia	EST	0.0	0.8	1.9	3.9	2.9	3.8	3.4	0.0	5.7	6.0	1.2	13.5
Finland	FIN	2.4	1.3	1.4	4.6	1.7	1.7	1.0	0.0	2.2	4.4	0.0	5.1
Florence	I	9.4	2.2	0.9	4.5	3.0	3.1	0.9	2.4	1.8	3.4	9.8	7.6
Geneva	CH	0.0	0.9	0.0	1.6	2.1	1.6	0.0	0.0	0.7	2.1	5.6	1.8
Genoa	I	0.0	0.0	0.5	4.3	2.1	1.7	0.0	0.0	1.1	0.8	0.0	2.0
Girona	E	–	0.0	0.6	0.0	0.0	–	–	–	–	–	–	–
Granada	E	–	–	–	–	–	–	–	–	–	–	–	–
Iceland	ICE	0.0	0.0	0.0	3.5	0.0	0.7	0.0	16.7	1.1	0.7	0.0	7.8
Isère	I	–	–	–	–	–	–	–	–	–	–	–	–
Latina	I	0.0	1.3	1.2	3.9	0.0	1.8	0.0	0.0	3.8	6.5	0.0	4.6
Mainz chll	D	–	0.0	–	3.2	0.0	0.0	1.6	0.0	0.0	4.3	4.8	3.0
Mallorca	E	0.0	0.0	0.9	0.0	6.1	3.6	0.0	10.0	1.7	4.2	0.0	7.4
Mersey	ENG	6.7	2.6	2.1	7.6	3.4	4.4	1.0	0.0	2.4	5.8	0.0	8.9
Modena	I	0.0	1.2	0.0	5.5	0.0	0.7	0.0	0.0	1.8	3.6	0.0	4.3
Navarra	E	0.0	0.0	1.0	3.3	4.3	1.1	0.0	0.0	0.8	3.3	0.0	2.6
Oxford	ENG	2.1	1.4	1.9	7.0	2.7	4.7	0.8	3.3	3.2	10.2	3.0	9.7
Parma	I	0.0	0.0	0.7	3.8	3.4	2.1	0.0	0.0	2.7	5.8	0.0	6.2
Piedmont	I	–	–	–	0.0	–	0.0	0.0	0.0	0.0	0.0	0.0	6.7
Ragusa	I	0.0	2.0	0.7	2.6	0.0	4.5	0.0	0.0	3.4	1.7	0.0	7.5
Romagna	I	0.0	0.0	0.0	2.7	0.0	1.8	0.0	0.0	0.5	2.5	0.0	8.0
Rotterdam	NL	–	–	–	–	–	–	–	–	–	–	–	–
Saarland	D	0.0	0.7	1.5	7.6	0.9	1.9	0.0	0.0	1.4	4.4	0.0	5.0
Scotland	SCO	1.8	2.7	2.9	8.3	2.6	5.2	0.4	1.1	3.5	11.3	0.3	9.8
Slovakia	SK	7.6	1.4	2.1	6.8	4.5	6.8	1.2	3.7	4.9	6.2	0.4	12.1
Slovenia	SLO	5.0	1.0	1.4	5.1	5.1	5.9	1.0	5.0	3.6	6.0	2.9	6.8
Somme	F	0.0	0.3	1.5	4.2	0.0	3.1	1.9	0.0	2.0	6.7	3.8	4.6
Sweden	S	0.0	1.4	0.4	2.9	0.8	1.6	0.0	0.0	1.2	3.4	0.0	2.1
Tarragona	E	0.0	0.6	0.4	7.1	0.0	2.7	3.8	0.0	1.1	6.2	0.0	4.5
Thames	ENG	5.9	2.2	2.8	8.5	3.0	4.2	0.5	3.3	3.5	9.5	0.7	8.5
Turin	I	0.0	1.9	2.0	14.8	9.1	6.7	4.4	0.0	3.2	12.8	4.8	22.8
Tyrol	A	100.0	5.5	1.8	10.1	4.2	6.0	2.6	0.0	1.8	4.8	0.0	12.5
Varese	I	0.0	0.5	0.7	3.7	3.4	2.7	1.1	0.0	1.8	1.5	0.0	4.1
Warsaw	PL	0.0	1.4	3.3	6.8	10.5	7.1	1.3	10.0	5.8	7.1	0.0	13.5
Wessex	ENG	9.1	1.8	2.1	7.6	1.9	5.0	0.5	1.8	2.6	13.6	0.0	18.4
W. Midlands	ENG	0.0	2.2	3.0	10.1	3.3	5.5	1.8	1.1	4.7	12.8	0.7	10.6
Yorkshire	ENG	0.0	2.2	1.7	7.6	3.4	3.4	1.0	4.6	3.4	8.9	2.1	10.8

(continued)

Table 5. (continued)

Registry	Country	Other nervous	Thyroid	Other endocrine	Other ill-defined sites	Secondary unspecified	Non-Hodgkin's	Hodgkin's	Multiple myeloma	Acute lymphoid leukaemia	Chronic lymphoid leukaemia	Acute myeloid leukaemia	Chronic myeloid leukaemia
		ICD-9 code											
		192	193	194	195	196–199	200–202	201	203	204.0	204.1	205.0	205.1
Basel	CH	–	–	–	–	–	4.9	0.0	5.6	9.1	1.4	11.9	8.7
Basque C.	E	0.0	6.2	1.7	23.1	24.8	5.6	7.3	4.4	8.2	2.5	21.1	8.3
Calvados	F	0.0	0.0	8.3	0.0	6.5	4.0	0.0	0.0	0.0	0.0	12.5	0.0
Côte d'Or	F	–	–	–	–	–	3.2	3.2	3.4	3.0	0.8	3.8	1.7
Cracow	PL	37.5	18.1	33.3	29.3	45.5	9.9	3.4	13.2	2.4	30.4	23.1	15.0
Denmark	DK	3.3	5.1	4.1	20.6	17.9	5.1	2.4	6.1	5.2	5.3	15.6	7.3
Doubs	F	0.0	20.9	0.0	33.3	39.1	14.5	9.3	10.3	0.0	4.6	0.3	19.2
E. Anglia	ENG	0.0	2.5	12.8	24.4	–	5.4	2.1	10.7	10.1	4.0	19.3	7.6
Eindhoven	NL	0.0	1.0	5.9	7.7	11.7	3.5	0.0	0.7	8.9	2.2	9.9	8.7
Estonia	EST	22.2	5.4	38.5	2.5	11.7	9.3	3.3	6.3	14.0	4.3	26.9	7.5
Finland	FIN	0.0	2.2	9.7	17.3	10.7	4.9	2.2	5.8	6.0	3.4	12.7	3.3
Florence	I	6.7	3.4	5.1	20.0	15.4	4.4	1.9	5.8	7.9	3.2	8.5	5.9
Geneva	CH	0.0	3.0	0.0	6.7	9.3	2.4	0.0	2.4	13.0	4.8	22.0	9.3
Genoa	I	0.0	2.8	0.0	27.7	11.1	1.5	1.3	5.8	10.3	1.2	7.9	4.7
Girona	E	–	–	–	–	–	0.0	–	–	–	–	–	–
Granada	E	–	–	–	–	–	–	–	–	–	–	–	–
Iceland	ICE	2.9	0.0	0.0	0.0	12.5	2.6	0.0	3.5	0.0	9.1	20.0	0.0
Isère	I	–	–	–	–	–	0.0	–	–	–	–	–	–
Latina	I	0.0	4.5	0.0	9.1	15.8	4.8	0.0	3.4	5.9	6.2	16.7	0.0
Mainz chll	D	0.0	12.5	2.6	0.0	0.0	0.9	0.0	–	1.2	–	4.7	3.6
Mallorca	E	0.0	4.0	20.0	33.3	19.9	4.5	0.0	4.3	0.0	0.0	22.6	0.0
Mersey	ENG	2.7	4.7	15.0	23.2	7.3	5.6	0.7	9.6	5.2	6.3	17.7	11.1
Modena	I	–	0.0	0.0	16.7	17.0	4.5	3.3	1.2	0.0	5.4	20.8	8.7
Navarra	E	0.0	0.7	0.0	19.2	17.4	1.5	0.0	5.3	0.0	1.4	17.1	3.7
Oxford	ENG	4.1	4.6	9.5	0.0	27.4	9.2	1.5	11.9	4.0	12.8	24.1	13.3
Parma	I	0.0	1.4	0.0	22.2	16.2	5.6	1.8	1.3	6.2	8.3	17.4	15.0
Piedmont	I	0.0	0.0	0.0	–	–	2.8	0.0	–	0.9	–	0.0	0.0
Ragusa	I	0.0	0.0	0.0	0.0	14.3	4.8	4.2	4.3	16.0	0.0	18.5	4.8
Romagna	I	0.0	1.1	0.0	30.0	8.9	3.2	0.0	3.7	11.1	1.5	17.1	0.0
Rotterdam	NL	–	–	–	–	–	–	–	–	–	–	–	–
Saarland	D	4.3	4.7	4.3	26.9	18.8	3.2	1.6	7.1	1.8	3.3	19.8	7.6
Scotland	SCO	6.1	4.8	6.3	35.9	26.5	8.2	3.1	11.2	7.4	6.8	20.8	7.8
Slovakia	SK	10.9	9.7	5.7	35.1	14.9	7.8	3.2	8.9	10.0	7.0	22.8	9.6
Slovenia	SLO	3.0	7.1	11.4	21.4	13.8	2.8	0.6	5.9	4.7	8.1	22.1	4.8
Somme	F	20.0	7.4	8.3	15.8	23.8	3.3	3.0	4.4	9.1	2.2	18.3	2.4
Sweden	S	3.0	2.4	0.8	12.1	8.8	3.6	0.6	2.4	5.4	6.0	13.0	3.8
Tarragona	E	0.0	4.3	7.7	18.6	19.8	8.1	1.9	3.8	13.8	2.6	26.2	5.0
Thames	ENG	3.7	7.0	8.9	18.2	29.5	8.2	1.7	9.7	6.2	7.2	14.8	9.0
Turin	I	0.0	7.7	11.1	41.7	45.5	13.7	8.3	14.6	21.9	15.4	47.1	16.7
Tyrol	A	100.0	4.1	7.7	66.7	34.3	8.4	0.0	2.4	5.6	4.4	27.6	13.3
Varese	I	0.0	2.5	0.0	38.5	9.6	2.7	0.0	1.2	6.0	5.0	21.4	2.4
W. Midlands	ENG	3.0	9.2	10.3	0.0	28.9	10.2	3.0	14.3	5.6	8.3	20.6	9.6
Warsaw	PL	7.7	6.3	0.0	30.8	0.0	6.1	4.3	18.7	7.7	5.1	32.7	11.1
Wessex	ENG	15.1	5.5	9.3	16.0	43.5	5.7	2.7	9.6	4.5	8.0	17.8	9.3
Yorkshire	ENG	7.1	3.8	5.3	23.9	25.5	7.5	1.6	10.7	7.0	4.1	19.9	8.1

Assuming that the survival of patients included in the study for each country is representative of the survival at the national level, a weighted estimate of the European observed and relative survival was calculated, using as weight the expected yearly number of incident cases (by gender, but for all ages combined) in each country. Weighted figures are given by age and gender (and overall) for each country.

For each country and for the weighted European estimates survival data were provided as age-specific figures, overall figures not standardised for age and age-standardised relative survival figures, by gender. Age-specific and age-standardised relative survival figures can be directly compared between countries and may be useful to evaluate the performance of different health systems. Relative survival figures not age-standardised describe the actual size of the problem in each country and in Europe and, together with incidence and mortality data, may be useful for planning purposes. Relative survival is also useful for comparing survival across ages without the interference of mortality from other causes.

INTERPRETATION OF SURVIVAL DIFFERENCES

Even after controlling for differential competitive mortality through the computation of relative survival rates and for demographic differences through age-standardisation, the interpretation of survival differences is not straightforward [6, 7]. Several factors which depend upon the validity of cancer registry data must be taken into account when comparing cancer patients' survival in different countries. Firstly, there has to be confidence that the cancer registration was fairly exhaustive, as indicated by a low proportion of cases known by death certificate only (DCO); that the diagnosis were reliable, as indicated by an high proportion of cases confirmed by histological examination; and that the follow-up was complete. The proportion of DCO cases, microscopically verified cases and cases lost to follow-up, by country is, therefore, always reported by cancer site and country in this Special Issue. The size of the biases introduced by different proportions of DCO and lost to follow-up is discussed elsewhere [6]; in the vast majority of cases, however, the bias is small with respect to the wide intercountry differences. Also different definitions of the date of diagnosis, e.g. date of first hospital admission or date of first histological confirmation or date of first treatment, can affect survival rates but only to a very minor degree [6]. In some cases, however, problems may arise from the actual capacity of the registry to trace the relevant date. For instance, it could be that in cancer registries with a very high proportion of cases dying in the first month (Table 5), the correct date of first diagnosis may sometimes have been missed and a date of complication registered instead.

More important biases may derive from the inclusion of a different case mix of tumours with a different prognosis in the same ICD category. Some of these problems could be addressed in the analysis of EUROCARE data, e.g. the different frequency of good prognosis glottic cancer and poor prognosis supraglottic cancer in Northern and Southern Europe ([8], pp. 2154–2161, whilst others are beyond the scope of basic analysis and shall require *ad hoc* high resolution studies, such as the probable different frequency of differentiated and undifferentiated gastric adenocarcinoma in high and low incidence countries and, in general, all the analyses by histotype.

A further comparability problem derives from the different coverage of cancer registration in different countries, from 100% in Nordic countries and some Eastern countries to less than 10% in some Central and Southern European countries. In the latter countries the areas covered by the registries may not be representative of the whole nation. The registries in some cases might have been established in areas particularly well equipped with cancer diagnostic and treatment facilities. Nevertheless, all the comparisons are made between geographically defined populations, without the risks of selection bias that affect the comparison of clinical series. The issue does not concern the validity of comparison but only the arbitrariness of the extrapolation of one or a set of regional registries to the whole country.

It should also be borne in mind that EUROCARE 'European' figures do not correspond to the total European population, but just to a subset of countries for which survival data are available, i.e. most countries ($n = 12$) in Western Europe but only four among former socialist Eastern European countries. The countries included in EUROCARE actually cover over 90% of the population of Western Europe and the European Union but only approximately 50% of wider Europe, including the republics of the former Soviet Union and Turkey. As for European Union countries, survival data are not yet available for Belgium, Greece, Ireland, Luxembourg and Portugal, which represent 8% of the EU population. For many cancer sites, it may be of interest to compare the ranking of the age-adjusted survival estimates for the 17 European countries included in the study with that of the usual economic indicators of gross domestic product and health expenditure (Table 6).

With all these caveats in mind, the question of whether the observed survival differences may depend on differences in the availability of and/or access to modern screening,

Table 6. *Gross domestic product per head and % household spending on health in European countries covered by EUROCARE*

Country	GDP per head ($)	GDP per head (PPP)	Household spending on health (% of total)
Northern Europe			
Iceland	23 670	n.a.	n.a.
Finland	22 980	72.9	9
Sweden	26 780	79.0	11
Denmark	25 930	80.8	9
U.K.	17 760	73.8	8
Western and Central Europe			
The Netherlands	20 590	76.0	11
Germany	22 920	89.3	13
Austria	22 110	79.9	10
Switzerland	36 230	98.4	15
France	22 300	83.3	13
Southern Europe			
Spain	14 020	57.3	7
Italy	20 510	77.0	10
Eastern Europe			
Slovenia	6300	n.a.	n.a.
Slovakia	1920	n.a.	6
Poland	1960	20.3	6
Estonia	2750	36.6	n.a.

n.a., not available.

diagnostic and treatment facilities in the various health systems can be addressed. A proper discussion of these factors would require detailed and standardised information on the extent of disease and on the diagnostic procedures actually used to define the extent, at least on a representative sample of incident cases. Both diagnostic and treatment procedures may vary considerably depending on socio-economic and cultural factors, health policy and clinical traditions. Such information is essential for a proper interpretation of survival differences, whether and how much they are true or due to leadtime bias, i.e. earlier diagnosis unaccompanied by later death, and how much the more effective treatment depends on more favourable stage distribution or on different treatment facilities and proper oncological organisation. Such an endeavour is the aim of EUROCARE III, a concerted action approved by the Biomed programme of the European Union from 1998 to the year 2000.

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APPENDIX

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