Munich Cancer Registry

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Munich Cancer Registry at Munich Cancer Center
Marchioninistr. 15
Munich, 81377
Germany

http://www.tumorregister-muenchen.de/en

Cancer statistics: Baseline statistics

C91: Lymphoid leukaemia

Year of diagnosis	1998-2013
Patients	3,818
Diseases	3,824
Creation date	05/19/2015
Export date	12/30/2014
Population	4.64 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C91__E.pdf

Global Statements about the statistics on the Internet −
Baseline Statistics (grey button), **Survival** (red button)

In these analyses, the clinics and physicians of Upper Bavaria and the city and county of Landshut[#], with a total of 4.64 million inhabitants, account for the frequency of cancer diseases[##] and the achieved long term results. Additionally, the long term survival evaluated by the Munich Cancer Registry (MCR) is compared with the results of the population-based registry in the USA (SEER), which is useful for checking the consistency of the data on an international level.

In comparing several tables, inconsistent figures may be detected. This is based on the fact that different patient cohorts are included in the base calculation, for example when proportions of multiple tumors or DCO-cases[###] are concerned. In other cases the individual tumor diagnosis is the basis for calculation, for example with incidence.

The foot notes describe the currentness of the data. The baseline statistics and survival data are updated annually. This yearly analysis comprises the Annual Report of the MCR. The time-delayed acquisition of data and the occasionally high DCO-rates indicate optimizing reserves, among others, because of current financial and legal conditions that hinder the analyses.

Clinics and physicians have access to essentially more detailed data, with which they can check, compare and in the best case optimize their own data and results.

We would be pleased to receive corrections, critique and useful suggestions. Just send an e-mail to tumor@ibe.med.uni-muenchen.de.

Munich Cancer Registry, May 2015

[#] Base data has been collected since 1998. An increase in new diseases is apparent, which is an effect of two extensions in the MCR catchment area (from a base population of 2.51 million to 3.96 in 2002, and to 4.52 million in 2007). Death certificates from 2014 are incorporated into these analyses.

[##] Due to the high frequency and good prognosis of non-malignant skin cancer (C44), no systematic ascertainment is performed for this diagnosis. C44 is not designated as a primary, but rather as a secondary tumor.

[###] DCO (death certificate only) identifies a cancer case that first becomes available to the MCR through the death certificate. A high proportion of DCO cases (≥5%) in particular cancer types indicate insufficient participation of specific cancer specializations.

Some remarks regarding this cancer type

The results for leukemias should be interpreted with caution. As with other primarily non-surgically or non-radiologically treated cancer diseases, the MCR hardly manages to obtain even the simplest information on this cancer. The proportion of DCO cases indicates a situation that is far away from a satisfying cooperation. In the group of institutions that potentially participate in reporting are a few hospitals that refuse any contribution to MCR.

ICD-10 codes (ICD-10 2015) used for specifying cancer site

Code	Description
C91.-	Lymphoid leukaemia
C91.0	Acute lymphoblastic leukaemia [ALL]
C91.1	Chronic lymphocytic leukaemia of B-cell type
C91.3	Prolymphocytic leukaemia of B-cell type
C91.4	Hairy-cell leukaemia
C91.5	Adult T-cell lymphoma/leukaemia (HTLV-1-associated)
C91.6	Prolymophocytic leukaemia of T-cell type
C91.7	Other lymphoid leukaemia
C91.8	Mature B-cell leukaemia Burkitt-type
C91.9	Lymphoid leukaemia, unspecified

... or ...

Morphology codes (ICD-O-3 2011) used for specifying cancer site

Code	Description
9823/3	B-cell lymphocytic leukemia/small lymphocytic lymphoma

INCIDENCE

Table 1

Patient cohorts by year of diagnosis including DCO cases and multiple primaries, and with proportion of deaths and active follow-up

Year of diagnosis	Cases n	DCO cases n	Prop. DCO %	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %	
1998	124	8	6.5	23.4	71.0	97.6	
1999	123	8	6.5	30.1	61.0	96.7	
2000	128	18	14.1	31.3	67.2	96.1	
2001	177	42	23.7	23.7	67.8	98.3	
2002	301	79	26.2	29.2	70.8	96.0	#
2003	256	69	27.0	25.0	64.5	96.5	
2004	295	55	18.6	29.2	54.2	92.9	
2005	275	59	21.5	31.3	60.7	94.9	
2006	276	44	15.9	37.0	55.4	91.7	
2007	327	60	18.3	25.7	52.6	79.5	# ##
2008	292	50	17.1	34.9	45.5	68.2	
2009	291	50	17.2	28.9	41.9	63.2	
2010	275	57	20.7	29.1	42.9	69.1	
2011	265	53	20.0	32.5	37.0	67.2	
2012	267	57	21.3	24.3	36.0	64.0	
2013	152	50	32.9	32.2	42.8	94.1	###
1998-2013	3824	759	19.8	29.4	53.1	83.3	

The increases of incident cases in 2002 and 2007 reflect the expansion to additional registry areas.

Since 2007 the percentage of actively followed patients sharply declined compared to the previous years. This is a consequence of ambiguous data protection rules that currently forbid cancer registries in Bavaria to obtain the essential life status informations from competent registration offices.

Please be aware that data of recent annual patient cohorts may not yet be fully processed. Therefore, the presented figures and tables are potentially related to different time periods as pointed out in the respective headlines or legends.

Table 1a

Patient cohorts by year of diagnosis and gender
including DCO cases

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	124	74	50	59.7
1999	123	62	61	50.4
2000	128	80	48	62.5
2001	177	98	79	55.4
2002	301	173	128	57.5
2003	256	159	97	62.1
2004	295	176	119	59.7
2005	275	177	98	64.4
2006	276	178	98	64.5
2007	327	184	143	56.3
2008	292	172	120	58.9
2009	291	161	130	55.3
2010	275	157	118	57.1
2011	265	152	113	57.4
2012	267	160	107	59.9
2013	152	94	58	61.8
1998-2013	3824	2257	1567	59.0

Table 2

Incidence measures by year of diagnosis and gender including DCO cases
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.64 m as of 2007, respectively)

Year of diagnosis	Males n	Females n	Males Inc. raw	Fem. Inc. raw	Males Inc. WS	Fem. Inc. WS	Males Inc. ES	Fem. Inc. ES	Males Inc. BRD-S	Fem. Inc. BRD-S
1998	74	50	6.7	4.3	5.0	2.4	6.3	3.1	7.4	3.7
1999	62	61	5.5	5.1	4.0	4.2	5.2	4.5	6.2	4.7
2000	80	48	7.0	4.0	5.2	2.7	6.7	3.1	7.5	3.4
2001	98	79	8.5	6.5	6.3	4.0	8.0	4.8	9.4	5.4
2002	173	128	9.3	6.5	6.4	3.1	8.2	4.3	9.9	5.3
2003	159	97	8.5	4.9	5.8	3.0	7.5	3.5	9.2	4.1
2004	176	119	9.4	6.0	6.6	3.5	8.2	4.3	9.7	5.0
2005	177	98	9.3	4.9	6.6	3.0	8.2	3.5	9.9	4.2
2006	178	98	9.3	4.9	6.6	3.0	8.2	3.4	9.5	4.0
2007	184	143	8.3	6.2	5.2	3.9	6.9	4.5	8.6	5.1
2008	172	120	7.7	5.2	5.6	3.1	6.5	3.6	7.6	4.2
2009	161	130	7.2	5.6	4.3	3.3	5.8	3.9	7.0	4.4
2010	157	118	7.0	5.0	4.5	2.9	5.6	3.3	6.9	3.9
2011	152	113	6.7	4.8	4.6	3.0	5.5	3.3	6.3	3.6
2012	160	107	7.0	4.5	4.9	3.3	5.7	3.4	6.8	3.7
2013	94	58	4.1	2.5	2.3	1.3	3.1	1.6	4.0	2.0
1998-2013	2257	1567	7.6	5.0	5.2	3.1	6.5	3.6	7.8	4.1

The computation of the incidence measures includes all primaries, irrespective of first or subsequent malignancy.

Table 3

Age distribution parameters by year of diagnosis (All)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	124	61.3	21.1	1.4	95.8	37.1	55.0	64.7	76.1	82.8
1999	123	57.7	23.4	0.3	89.4	6.0	53.5	62.5	74.1	79.8
2000	128	61.5	20.6	2.1	91.2	38.5	55.6	63.7	73.5	85.0
2001	177	62.9	22.3	1.4	94.0	17.0	56.9	67.4	76.5	87.3
2002	301	65.8	20.2	2.6	95.0	40.4	60.5	68.7	78.9	87.9
2003	256	64.6	22.4	0.3	98.9	29.5	59.1	69.2	79.4	85.6
2004	295	62.8	21.9	1.4	98.6	29.0	56.8	67.6	77.5	84.5
2005	275	63.2	24.2	0.6	97.1	16.4	57.6	70.8	78.3	85.1
2006	276	63.7	23.3	1.3	95.4	18.1	58.0	69.8	78.7	85.9
2007	327	64.4	22.3	0.3	99.8	26.9	56.9	69.3	80.3	86.1
2008	292	63.7	24.6	0.4	97.4	13.7	60.5	70.0	79.6	86.3
2009	291	65.9	20.9	1.3	98.6	43.0	57.6	69.8	80.7	86.9
2010	275	65.7	24.1	0.3	101	24.7	56.9	72.8	81.9	88.4
2011	265	63.4	25.1	2.5	101	12.7	54.4	70.8	80.7	88.0
2012	267	61.8	26.8	0.6	96.9	11.1	50.5	71.6	81.0	87.3
2013	152	68.9	21.7	2.8	100	36.7	64.5	74.6	83.7	88.6
1998-2013	3824	63.9	23.1	0.3	101	21.3	57.3	69.5	79.3	86.5

Table 3a

Age distribution parameters by year of diagnosis (MALES)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	74	58.0	21.6	2.0	95.8	33.9	51.3	61.3	72.5	81.0
1999	62	59.2	21.6	0.3	89.4	31.9	54.1	61.0	74.7	80.4
2000	80	61.0	18.7	2.6	91.1	44.3	55.3	63.4	70.9	79.5
2001	98	60.1	20.7	1.4	90.7	17.0	53.2	65.5	73.7	79.6
2002	173	62.1	20.8	2.6	90.9	31.1	57.4	66.1	75.5	82.5
2003	159	63.0	21.0	1.6	90.7	29.5	57.7	67.4	76.5	83.7
2004	176	61.0	22.0	1.4	95.2	25.6	55.7	65.2	75.2	81.9
2005	177	62.0	23.6	0.7	94.6	15.6	55.9	69.0	77.2	83.0
2006	178	62.2	23.3	1.3	95.4	17.6	55.9	68.6	77.6	85.1
2007	184	64.3	19.8	0.3	97.8	39.6	56.7	69.0	77.9	83.8
2008	172	61.7	24.9	0.4	93.7	10.2	60.5	69.6	77.1	83.5
2009	161	66.2	18.3	2.2	97.0	48.2	57.9	69.6	77.8	85.3
2010	157	64.4	23.7	0.3	101	19.7	54.7	71.6	80.5	87.0
2011	152	62.0	24.1	2.5	101	12.7	54.1	69.1	77.9	84.7
2012	160	61.9	25.7	2.4	95.2	12.1	52.2	71.6	79.6	84.9
2013	94	69.3	20.8	2.8	100	41.3	65.0	74.1	83.6	87.4
1998-2013	2257	62.6	22.3	0.3	101	23.4	56.0	68.3	77.4	84.1

Table 3b

Age distribution parameters by year of diagnosis (FEMALES)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	50	66.3	19.4	1.4	90.3	43.1	61.0	68.6	77.9	85.9
1999	61	56.3	25.2	1.5	88.4	4.1	52.3	63.5	73.6	77.1
2000	48	62.5	23.8	2.1	91.2	4.6	57.9	65.2	77.4	86.5
2001	79	66.4	23.8	2.8	94.0	16.2	61.5	72.0	82.6	90.4
2002	128	70.9	18.2	2.9	95.0	49.5	63.8	74.3	83.3	90.1
2003	97	67.2	24.5	0.3	98.9	29.4	60.5	73.7	81.7	90.6
2004	119	65.5	21.6	4.3	98.6	35.3	58.1	69.4	80.2	87.3
2005	98	65.3	25.1	0.6	97.1	16.4	62.4	74.7	80.7	88.9
2006	98	66.4	23.3	2.5	93.9	18.1	60.7	73.0	81.3	87.1
2007	143	64.7	25.3	1.0	99.8	13.3	57.2	71.3	82.6	87.6
2008	120	66.5	23.9	1.4	97.4	20.6	60.6	71.9	82.6	88.6
2009	130	65.6	23.8	1.3	98.6	26.5	57.5	71.8	82.9	88.1
2010	118	67.6	24.7	0.8	97.5	24.7	60.9	75.5	84.2	89.5
2011	113	65.2	26.5	2.5	96.7	12.8	56.6	73.1	83.9	90.0
2012	107	61.6	28.5	0.6	96.9	9.2	44.3	71.5	84.8	88.9
2013	58	68.2	23.2	3.2	91.6	28.8	63.9	75.9	84.2	90.6
1998-2013	1567	65.7	24.1	0.3	99.8	19.0	59.2	72.3	82.4	88.7

Table 4

Age distribution by 5-year age group and gender for period 1998-2013 (incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	176	4.6	4.6	100	4.4	4.4	76	4.9	4.9
5-9	92	2.4	7.0	54	2.4	6.8	38	2.4	7.3
10-14	56	1.5	8.5	30	1.3	8.2	26	1.7	8.9
15-19	50	1.3	9.8	31	1.4	9.5	19	1.2	10.1
20-24	28	0.7	10.5	15	0.7	10.2	13	0.8	11.0
25-29	23	0.6	11.1	14	0.6	10.8	9	0.6	11.6
30-34	27	0.7	11.8	21	0.9	11.7	6	0.4	11.9
35-39	48	1.3	13.1	31	1.4	13.1	17	1.1	13.0
40-44	79	2.1	15.1	47	2.1	15.2	32	2.0	15.1
45-49	102	2.7	17.8	68	3.0	18.2	34	2.2	17.2
50-54	173	4.5	22.3	124	5.5	23.7	49	3.1	20.4
55-59	253	6.6	28.9	163	7.2	30.9	90	5.7	26.1
60-64	373	9.8	38.7	227	10.1	41.0	146	9.3	35.4
65-69	481	12.6	51.3	314	13.9	54.9	167	10.7	46.1
70-74	495	12.9	64.2	323	14.3	69.2	172	11.0	57.1
75-79	477	12.5	76.7	281	12.5	81.7	196	12.5	69.6
80-84	403	10.5	87.2	217	9.6	91.3	186	11.9	81.4
85+	488	12.8	100.0	197	8.7	100.0	291	18.6	100.0
All ages	3824	100.0		2257	100.0		1567	100.0	

Included in the statistics are 44.8% multiple primaries in males and 31.5% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2013

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=369 %	Females DCO rate n=387 %	Males Prop.all cancers n=158258 %	Females Prop.all cancers n=153136 %
0- 4	100	76	6.7	5.4			30.9	31.1
5- 9	54	38	3.6	2.7	1.9		30.7	30.4
10-14	30	26	2.0	1.8			18.1	15.3
15-19	31	19	2.0	1.3	3.2	5.3	8.8	6.5
20-24	15	13	0.8	0.7		7.7	2.4	2.5
25-29	14	9	0.7	0.4	7.1	11.1	1.4	0.8
30-34	21	6	0.9	0.3	4.8		1.4	0.3
35-39	31	17	1.2	0.7		5.9	1.4	0.5
40-44	47	32	1.8	1.3	4.3		1.5	0.5
45-49	68	34	2.9	1.5	1.5		1.3	0.4
50-54	124	49	6.1	2.4	4.0	8.2	1.4	0.4
55-59	163	90	8.9	4.7	4.9	1.1	1.1	0.7
60-64	227	146	12.8	7.8	6.6	7.5	1.0	0.8
65-69	314	167	19.9	9.7	9.6	7.2	1.1	0.9
70-74	323	172	25.2	11.3	13.0	14.0	1.2	0.9
75-79	281	195	34.0	16.4	24.6	24.6	1.4	1.1
80-84	217	185	43.4	19.8	33.2	50.8	1.6	1.2
85+	196	290	57.5	32.4	61.7	65.2	2.0	1.7
All ages	2256	1564			16.4	24.7	1.4	1.0
Incidence								
Raw			7.6	5.0				
WS			5.2	3.1				
ES			6.5	3.6				
BRD-S			7.8	4.1				

The age-specific incidence characterizes the disease risk in a particular age group. The age distribution depends on the patient population frequency in each age group and reflects the tangible clinical picture of everyday patients care (see following chart).

Table 6a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2013
MALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C07-C08	Salivary gland	5	0.2	22.4	7.3	52.3	#	7.4	
C15	Oesophagus	4	1.8	2.3	0.6	5.8		3.5	
C16	Stomach	10	4.1	2.4	1.2	4.5	#	9.2	
C18	Colon	20	9.9	2.0	1.2	3.1	#	15.7	5.0
C19-C20	Rectum	14	5.5	2.5	1.4	4.2	#	13.2	
C22	Liver	7	2.8	2.5	1.0	5.2	#	6.6	14.3
C25	Pancreas	4	3.6	1.1	0.3	2.9		0.7	
C33-C34	Lung	31	11.8	2.6	1.8	3.7	#	29.9	
C43	Malign. melanoma	17	4.0	4.3	2.5	6.8	#	20.3	
C46,C49	Soft tissue	3	0.5	5.6	1.2	16.5	#	3.8	
C50	Breast	2	0.3	7.8	0.9	28.1		2.7	
C61	Prostate	65	29.7	2.2	1.7	2.8	#	55.0	3.1
C62	Testis	2	0.3	7.4	0.9	26.6		2.7	
C64	Kidney	5	3.5	1.4	0.5	3.3		2.3	
C65	Renal pelvis	2	0.4	4.8	0.6	17.5		2.5	
C67	Bladder	10	4.4	2.3	1.1	4.2	#	8.7	
C70-C72	CNS cancer	4	1.3	3.0	0.8	7.7		4.2	
C73	Thyroid	2	0.6	3.1	0.4	11.3		2.1	
C76-C79	CUP	3	1.7	1.8	0.4	5.2		2.0	
C81	Hodgkin lymphoma	5	0.2	23.3	7.6	54.5	#	7.4	
C82-C85	NHL	11	4.0	2.7	1.4	4.9	#	10.9	27.3
C90	Mult. myeloma	3	1.3	2.3	0.5	6.8		2.7	
C91-C96	Leukaemia	8	1.6	4.9	2.1	9.6	#	9.9	37.5
Other primaries		5	2.1	2.4	0.8	5.7		4.6	20.0
Not observed		0	5.5	0.0	0.0	0.7	#	-8.6	
All mult. primaries		242	101.0	2.4	2.1	2.7	#	219.3	4.5

Patients	1378
Median age at second malignancy (years)	71.7
Person-years	6429
Mean observation time (years)	4.7
Median observation time (years)	4.1

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category "Other primaries".

Table 6b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2013
FEMALES

Diagnosis	Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C09-C10 Oropharynx	2	0.2	12.6	1.5	45.6	#	4.6	
C16 Stomach	5	1.6	3.1	1.0	7.3	#	8.6	
C18 Colon	7	4.4	1.6	0.6	3.3		6.6	14.3
C19-C20 Rectum	2	1.9	1.1	0.1	3.8		0.3	
C21 Anus/canal	2	0.2	9.2	1.1	33.2	#	4.5	
C25 Pancreas	3	1.9	1.6	0.3	4.6		2.8	
C33-C34 Lung	9	3.0	3.0	1.4	5.8	#	15.3	
C43 Malign. melanoma	6	1.4	4.2	1.5	9.1	#	11.5	
C50 Breast	29	12.4	2.3	1.6	3.4	#	41.9	
C54 Corpus uteri	4	2.4	1.7	0.5	4.3		4.1	
C56 Ovary	3	1.8	1.7	0.3	5.0		3.1	
C73 Thyroid	3	0.7	4.4	0.9	12.8		5.8	
C76-C79 CUP	2	0.8	2.6	0.3	9.5		3.1	
C82-C85 NHL	10	1.7	6.0	2.9	11.0	#	21.0	20.0
C90 Mult. myeloma	2	0.5	3.7	0.4	13.2		3.7	
C91-C96 Leukaemia	3	0.7	4.3	0.9	12.6		5.8	
Other primaries	6	2.0	3.0	1.1	6.5	#	10.1	
Not observed	0	4.9	0.0	0.0	0.8	#	-12.4	
All mult. primaries	98	42.4	2.3	1.9	2.8	#	140.3	3.1

Patients	863
Median age at second malignancy (years)	72.6
Person-years	3963
Mean observation time (years)	4.6
Median observation time (years)	4.0

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category "Other primaries".

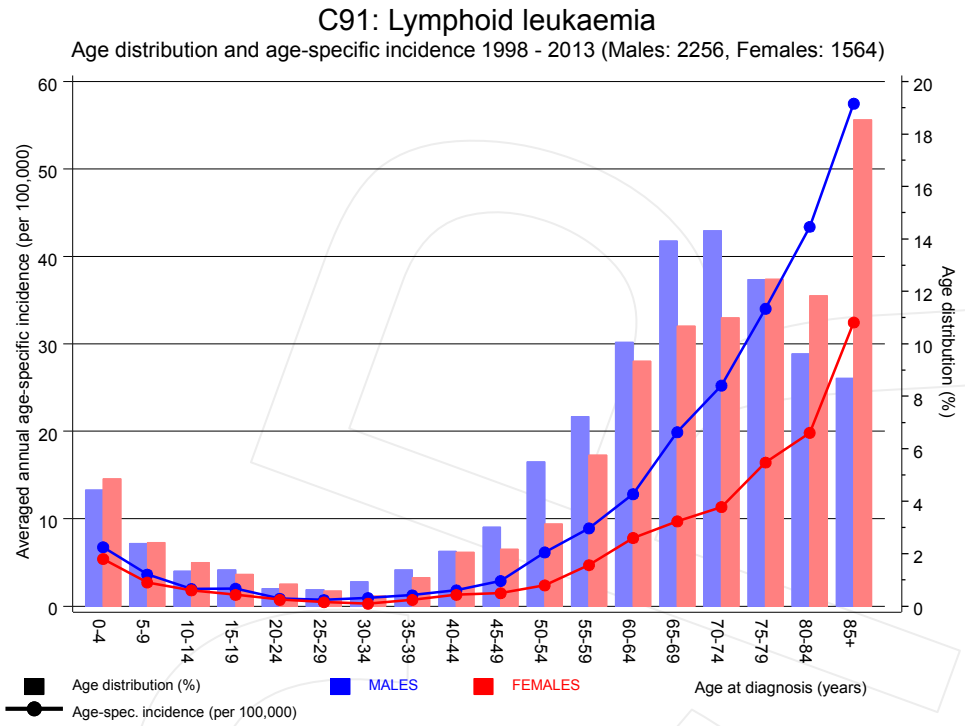


Figure 7. Age distribution and age-specific incidence

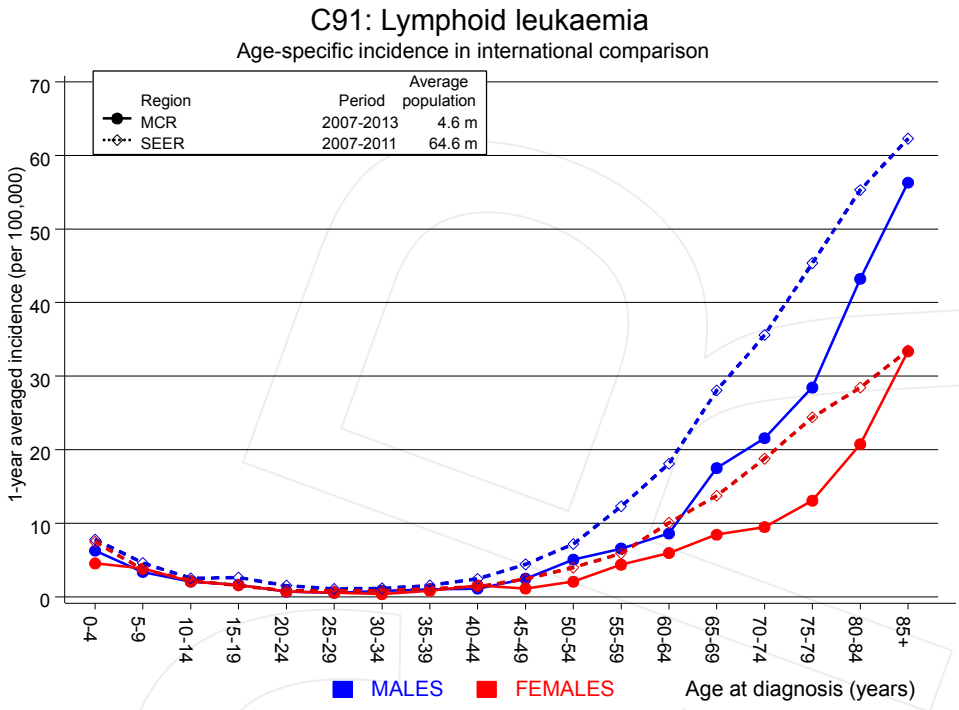


Figure 7a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2014, based on the November 2013 submission. http://www.seer.cancer.gov.

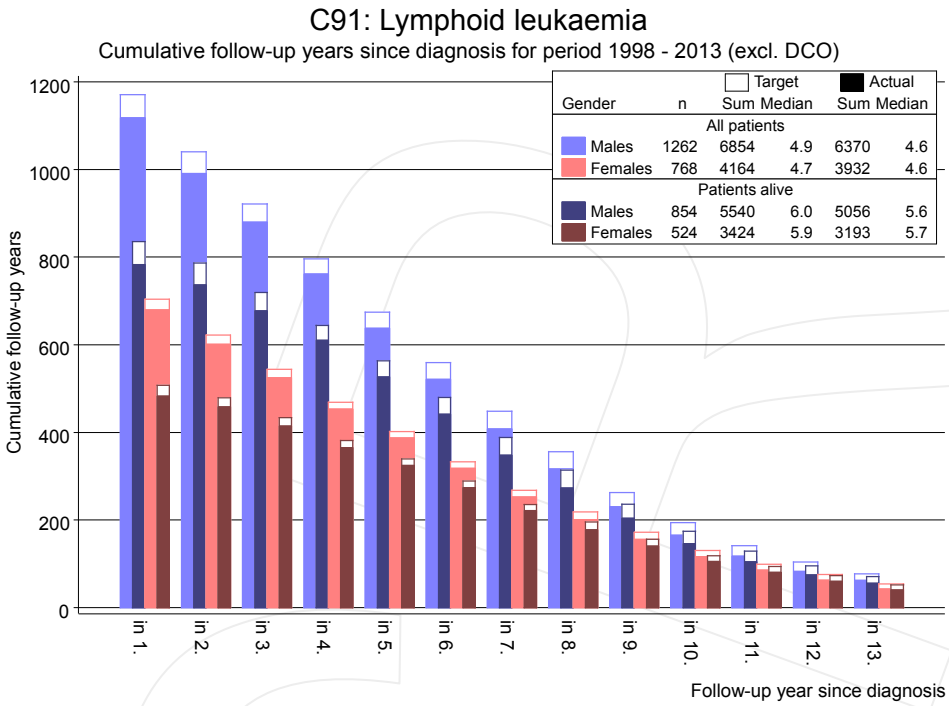
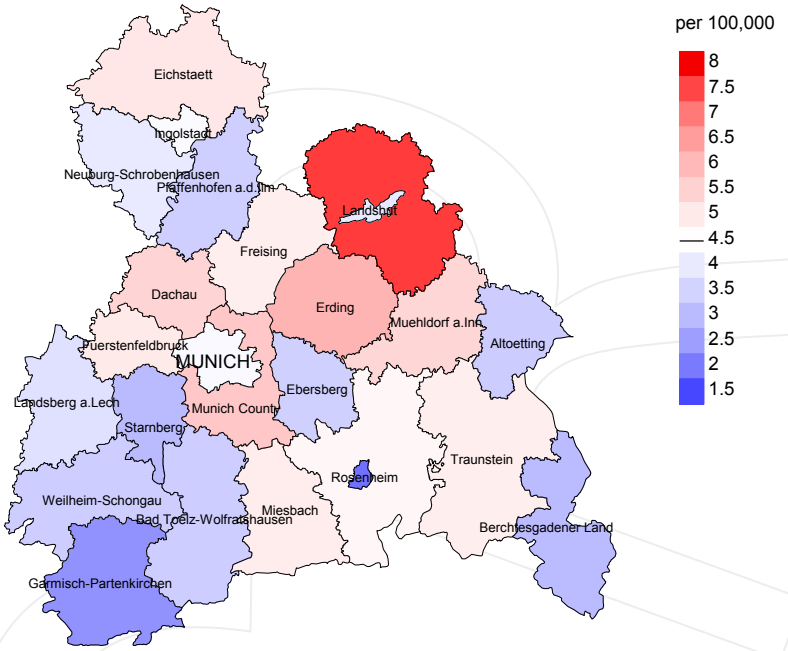


Figure 8. Cumulative follow-up years depending on time since diagnosis

The increase of the lost to follow-up rate can be interpreted as a consequence of a declining number of survivors over time.

Average incidence (world standard population) 2007 - 2013: Males



Average incidence (world standard population) 2007 - 2013: Females

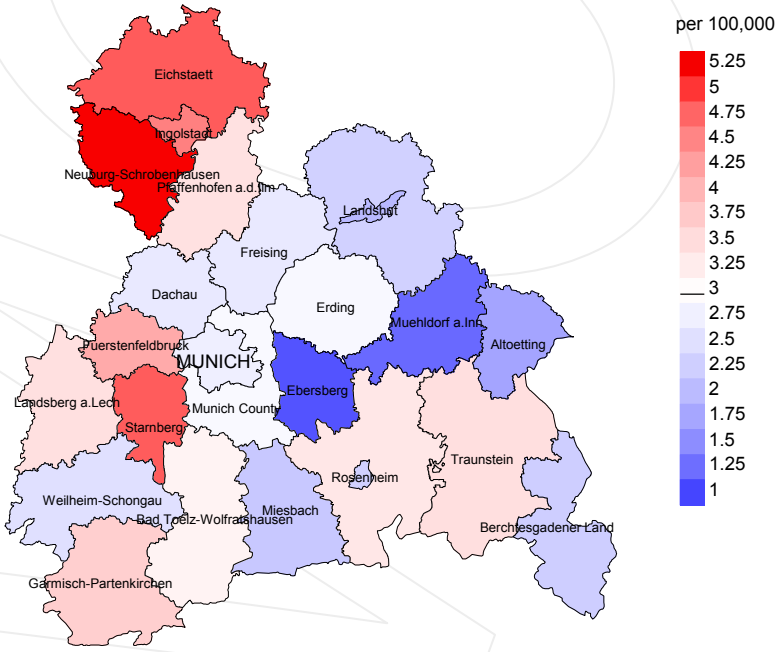
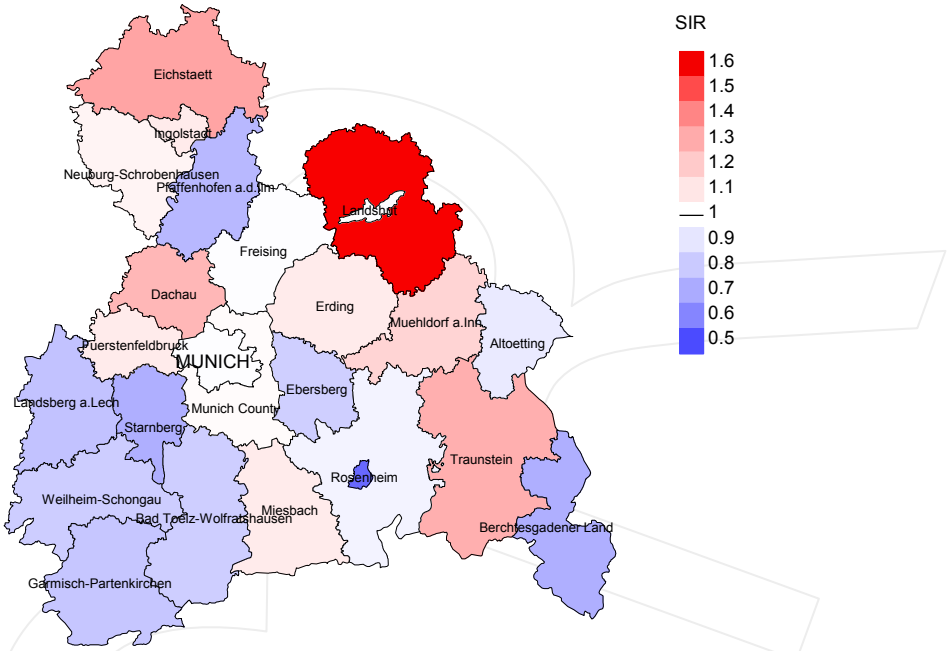


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 4.5/100,000 WS N=1,080, females 3.0/100,000 WS N=788).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 a total of 14 women were identified with newly diagnosed lymphoid leukaemia. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 1.1/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.4 and 2.4/100,000.

Standardized incidence ratio (SIR) 2007 - 2013: Males



Standardized incidence ratio (SIR) 2007 - 2013: Females

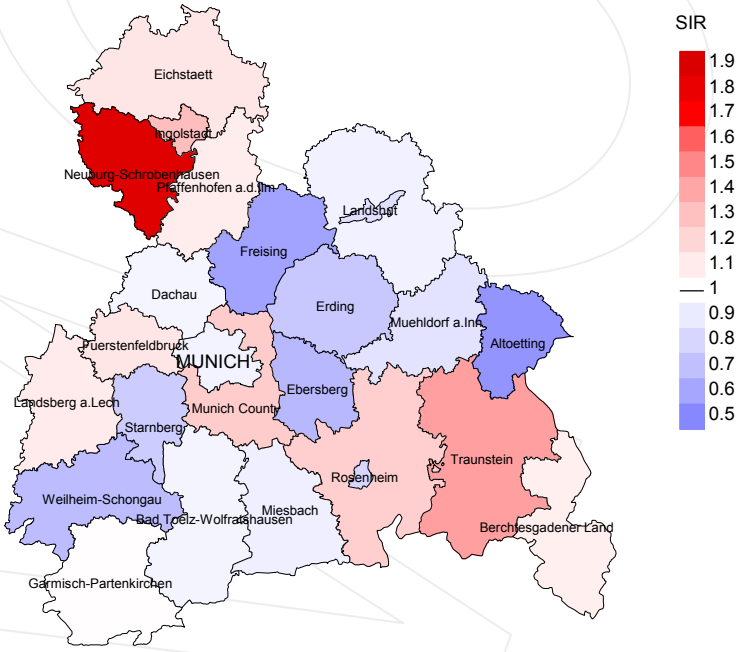


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=1,080, females N=788).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 a total of 14 women were identified with newly diagnosed lymphoid leukaemia. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.67. Though, the value of this parameter may vary with an underlying probability of 99% between 0.30 and 1.29, and is therefore not statistically striking.

MORTALITY

Table 10a

Patient cohorts of incident cancers by year of diagnosis, follow-up status, proportion of DCO, deaths among the annual cohorts, and proportion of available death certificates (with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of diagnosis	Incident cases n	Prop. actively followed %	Prop. DCO %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	124	97.6	6.5	88	71.0	98.9
1999	123	96.7	6.5	75	61.0	96.0
2000	128	96.1	14.1	86	67.2	97.7
2001	177	98.3	23.7	120	67.8	97.5
2002	301	96.0	26.2	213	70.8	98.6
2003	256	96.5	27.0	165	64.5	98.8
2004	295	92.9	18.6	160	54.2	100.0
2005	275	94.9	21.5	167	60.7	98.8
2006	276	91.7	15.9	153	55.4	96.1
2007	327	79.5	18.3	172	52.6	98.8
2008	292	68.2	17.1	133	45.5	97.0
2009	291	63.2	17.2	122	41.9	96.7
2010	275	69.1	20.7	118	42.9	96.6
2011	265	67.2	20.0	98	37.0	100.0
2012	267	64.0	21.3	96	36.0	99.0
2013	152	94.1	32.9	65	42.8	98.5
1998-2013	3824	83.3	19.8	2031	53.1	98.1

Table 10b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased the same year of cancer diagnosis
(incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of diagnosis/ death	Incident cases n	Deaths n	Prop. deaths with death certific. %	Deaths in same year n	Prop. deaths in same year %
1998	124	50	98.0	10	8.1
1999	123	59	93.2	7	5.7
2000	128	65	93.8	20	15.6
2001	177	109	96.3	46	26.0
2002	301	153	98.7	92	30.6
2003	256	142	98.6	83	32.4
2004	295	141	99.3	62	21.0
2005	275	168	100.0	72	26.2
2006	276	163	98.2	61	22.1
2007	327	184	98.4	78	23.9
2008	292	182	98.9	65	22.3
2009	291	158	100.0	57	19.6
2010	275	184	98.9	73	26.5
2011	265	185	99.5	61	23.0
2012	267	198	98.5	67	25.1
2013	152	186	98.9	60	39.5
1998-2013	3824	2327	98.5	914	23.9

Table 10c

Annual cohorts of deaths, proportion of cancer-related and non-cancer-related deaths, and cancer recorded on death certificates (incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	50	68.0	32.0	91.8
1999	59	67.8	32.2	89.1
2000	65	66.2	33.8	98.4
2001	109	63.3	36.7	93.3
2002	153	78.4	21.6	96.0
2003	142	81.7	18.3	95.0
2004	141	87.2	12.8	95.0
2005	168	82.1	17.9	97.0
2006	163	80.4	19.6	92.5
2007	184	77.7	22.3	91.2
2008	182	82.4	17.6	90.6
2009	158	84.8	15.2	93.0
2010	184	79.9	20.1	93.4
2011	185	77.3	22.7	89.1
2012	198	78.3	21.7	89.7
2013	186	73.7	26.3	86.4
1998-2013	2327	78.3	21.7	92.3

Table 11a

Medians of age at death according to the grouping in Table 10
MALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	31	68.2	67.5	83.5	67.9
1999	34	71.6	65.5	82.9	68.8
2000	44	71.4	70.1	77.1	71.4
2001	55	73.7	72.0	79.2	72.2
2002	88	75.5	75.2	77.1	76.5
2003	80	72.4	72.3	75.5	72.4
2004	88	73.3	71.8	81.2	73.3
2005	101	76.3	73.9	79.4	75.7
2006	98	74.3	73.0	82.4	73.7
2007	102	76.4	75.2	81.6	76.4
2008	111	75.1	74.6	80.9	75.0
2009	92	78.9	76.7	84.0	78.9
2010	109	77.0	76.2	79.8	77.4
2011	112	76.6	75.9	79.5	76.2
2012	124	77.5	76.6	82.0	77.6
2013	119	75.3	74.3	82.8	75.3
1998-2013	1388	75.5	74.0	80.1	75.3

Deaths of patients are considered to be cancer-related, in case that fact was recorded on the death certificate, or patients had suffered from metastasis or recurrence.

Table 11b

Medians of age at death according to the grouping in Table 10
FEMALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	19	78.6	73.1	82.2	76.9
1999	25	79.5	74.9	83.2	76.5
2000	21	83.4	77.6	88.7	83.3
2001	54	77.8	75.3	81.3	77.3
2002	65	82.4	74.9	88.7	79.2
2003	62	78.9	77.5	84.5	78.4
2004	53	78.4	76.9	84.8	77.5
2005	67	80.8	78.1	89.3	80.7
2006	65	78.0	77.5	81.8	77.8
2007	82	81.1	77.5	87.5	81.1
2008	71	82.7	80.1	90.1	81.9
2009	66	79.5	77.3	83.5	79.5
2010	75	82.3	82.0	89.6	82.2
2011	73	80.9	75.5	85.9	79.8
2012	74	79.5	78.9	82.3	78.9
2013	67	81.9	78.8	85.5	82.1
1998-2013	939	80.1	77.9	86.1	79.4

By 2010, life expectancy for a newborn male in Germany is 77.5 years compared with 82.6 years for his female counterpart.

Deaths of patients are considered to be cancer-related, in case that fact was recorded on the death certificate, or patients had suffered from metastasis or recurrence.

Table 12a

Mortality measures (cancer-related death) and mortality-incidence-index
by year of death
MALES

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998	24	2.2	0.32	1.6	0.32	2.1	0.33	2.4	0.33
1999	22	2.0	0.35	1.6	0.39	1.9	0.36	2.3	0.37
2000	30	2.6	0.38	2.1	0.40	2.6	0.39	2.9	0.39
2001	38	3.3	0.39	1.9	0.31	2.9	0.37	4.0	0.43
2002	73	3.9	0.42	2.1	0.33	3.3	0.40	4.7	0.47
2003	65	3.5	0.41	1.9	0.33	2.9	0.39	4.0	0.44
2004	78	4.1	0.44	2.2	0.34	3.4	0.41	4.6	0.47
2005	81	4.3	0.46	2.4	0.36	3.4	0.42	4.7	0.47
2006	79	4.1	0.45	2.1	0.32	3.1	0.39	4.3	0.46
2007	82	3.7	0.45	2.0	0.38	2.9	0.42	4.0	0.46
2008	91	4.1	0.53	2.0	0.35	3.0	0.47	4.2	0.55
2009	80	3.6	0.50	1.6	0.39	2.6	0.45	3.6	0.52
2010	86	3.8	0.55	1.6	0.35	2.6	0.45	3.8	0.56
2011	91	4.0	0.60	1.8	0.39	2.8	0.50	3.9	0.62
2012	92	4.0	0.58	1.8	0.38	2.8	0.50	4.0	0.58
2013	90	3.9	0.96	1.7	0.74	2.7	0.84	3.7	0.94
1998-2013	1102	3.7	0.49	1.9	0.37	2.9	0.44	4.0	0.51

Table 12b

Mortality measures (cancer-related death) and mortality-incidence-index
by year of death
FEMALES

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998	10	0.9	0.20	0.5	0.19	0.6	0.19	0.7	0.19
1999	18	1.5	0.30	0.7	0.17	1.0	0.22	1.3	0.27
2000	13	1.1	0.27	0.7	0.25	0.8	0.25	0.9	0.26
2001	31	2.5	0.40	1.0	0.26	1.5	0.32	2.1	0.40
2002	47	2.4	0.37	1.1	0.36	1.6	0.37	2.0	0.38
2003	51	2.6	0.53	1.1	0.35	1.6	0.44	2.1	0.52
2004	45	2.3	0.38	1.0	0.30	1.4	0.32	1.8	0.37
2005	57	2.9	0.58	1.0	0.32	1.5	0.44	2.1	0.51
2006	52	2.6	0.53	1.1	0.36	1.5	0.44	2.1	0.53
2007	61	2.6	0.43	1.1	0.27	1.5	0.33	2.0	0.40
2008	59	2.5	0.49	1.0	0.31	1.4	0.38	1.9	0.45
2009	54	2.3	0.42	1.0	0.31	1.4	0.36	1.8	0.42
2010	61	2.6	0.52	1.0	0.33	1.4	0.41	1.9	0.49
2011	52	2.2	0.46	0.9	0.30	1.2	0.37	1.6	0.43
2012	63	2.7	0.59	0.9	0.27	1.3	0.39	1.9	0.51
2013	47	2.0	0.81	0.8	0.59	1.1	0.67	1.5	0.75
1998-2013	721	2.3	0.46	0.9	0.31	1.3	0.37	1.8	0.44

Table 13

Age distribution of age at death (cancer-related) for period 1998-2013
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
0-4	6	0.3	0.3	3	0.3	0.3	3	0.4	0.4
5-9	13	0.7	1.0	7	0.6	0.9	6	0.8	1.2
10-14	17	0.9	2.0	8	0.7	1.6	9	1.2	2.5
15-19	10	0.5	2.5	4	0.4	2.0	6	0.8	3.3
20-24	16	0.9	3.4	11	1.0	3.0	5	0.7	4.0
25-29	9	0.5	3.9	7	0.6	3.6	2	0.3	4.3
30-34	9	0.5	4.4	7	0.6	4.2	2	0.3	4.6
35-39	21	1.1	5.5	11	1.0	5.2	10	1.4	5.9
40-44	14	0.8	6.3	12	1.1	6.3	2	0.3	6.2
45-49	27	1.5	7.8	14	1.3	7.6	13	1.8	8.0
50-54	35	1.9	9.7	22	2.0	9.6	13	1.8	9.8
55-59	79	4.3	14.0	54	4.9	14.5	25	3.5	13.3
60-64	134	7.3	21.3	88	7.9	22.4	46	6.4	19.6
65-69	215	11.7	33.1	155	14.0	36.4	60	8.3	27.9
70-74	288	15.7	48.8	190	17.2	53.6	98	13.6	41.5
75-79	319	17.4	66.2	198	17.9	71.5	121	16.7	58.2
80-84	309	16.9	83.1	170	15.4	86.8	139	19.2	77.5
85+	309	16.9	100.0	146	13.2	100.0	163	22.5	100.0
All ages	1830	100.0		1107	100.0		723	100.0	

Included in the statistics are 44.8% multiple primaries in males and 31.5% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**incl. multiple primaries**)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4	3	3	0.2	0.03	0.2	0.04	9.1	11.5
5- 9	7	6	0.5	0.13	0.4	0.16	18.4	15.0
10-14	8	9	0.5	0.27	0.6	0.35	22.9	29.0
15-19	4	6	0.3	0.13	0.4	0.32	8.9	16.2
20-24	11	5	0.6	0.73	0.3	0.38	12.2	9.8
25-29	7	2	0.3	0.50	0.1	0.22	6.5	1.7
30-34	7	2	0.3	0.33	0.1	0.33	3.8	0.9
35-39	11	10	0.4	0.35	0.4	0.59	2.8	1.9
40-44	12	2	0.5	0.26	0.1	0.06	1.4	0.2
45-49	14	13	0.6	0.21	0.6	0.38	0.8	0.6
50-54	22	13	1.1	0.18	0.6	0.27	0.7	0.4
55-59	54	25	2.9	0.33	1.3	0.28	0.9	0.5
60-64	88	46	5.0	0.39	2.5	0.32	1.0	0.7
65-69	155	60	9.8	0.49	3.5	0.36	1.3	0.7
70-74	190	98	14.8	0.59	6.5	0.57	1.4	1.0
75-79	198	121	24.0	0.70	10.2	0.62	1.5	1.1
80-84	170	139	34.0	0.78	14.9	0.75	1.6	1.2
85+	146	163	42.8	0.74	18.2	0.56	1.6	1.2
All ages	1107	723					1.4	1.0
Mortality								
Raw			3.7	0.49	2.3	0.46		
WS			1.9	0.37	0.9	0.31		
ES			2.9	0.44	1.3	0.37		
BRD-S			4.0	0.51	1.8	0.44		
PYLL-70								
per 100,000			20.5		13.3			
ES			20.8		14.5			
AYLL-70			13.7		17.4			

The rates underestimate the prognosis if other synchronous cancers are prognostic unfavorable.

Table 15a

Multiple primaries in deaths in period 1998-2013
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	11	1.7	2	18.2			9	81.8
C18	Colon	48	7.2	18	37.5	7	14.6	23	47.9
C19-C20	Rectum	28	4.2	7	25.0	6	21.4	15	53.6
C25	Pancreas	8	1.2			2	25.0	6	75.0
C33-C34	Lung	63	9.5	7	11.1	14	22.2	42	66.7
C43	Malign. melanoma	36	5.4	15	41.7	3	8.3	18	50.0
C44	Skin others	171	25.7	18	10.5	9	5.3	144	84.2
C46,C49	Soft tissue	12	1.8	5	41.7			7	58.3
C61	Prostate	98	14.7	45	45.9	13	13.3	40	40.8
C64	Kidney	15	2.3	7	46.7	2	13.3	6	40.0
C67	Bladder	32	4.8	14	43.8	4	12.5	14	43.8
C70-C72	CNS cancer	10	1.5			3	30.0	7	70.0
C76-C79	CUP	7	1.1					7	100.0
C81	Hodgkin lymphoma	12	1.8	4	33.3	2	16.7	6	50.0
C82-C85	NHL	32	4.8			8	25.0	24	75.0
C90	Mult. myeloma	11	1.7	3	27.3	5	45.5	3	27.3
C91-C96	Leukaemia	23	3.5			3	13.0	20	87.0
Other primaries		49	7.4	16	32.7	9	18.4	24	49.0
All mult. primaries		666	100.0	161	24.2	90	13.5	415	62.3

Multiple primaries with number of cases 1 to 6 are pooled in category "Other primaries".

ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a multiple malignancy.

Table 15b

Multiple primaries in deaths in period 1998-2013
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C16	Stomach	7	2.4	1	14.3	4	57.1	2	28.6
C18	Colon	20	7.0	7	35.0	2	10.0	11	55.0
C19-C20	Rectum	7	2.4	4	57.1			3	42.9
C23-C24	Bile	3	1.0	1	33.3	1	33.3	1	33.3
C25	Pancreas	6	2.1					6	100.0
C33-C34	Lung	13	4.5			1	7.7	12	92.3
C43	Malign. melanoma	10	3.5	7	70.0			3	30.0
C44	Skin others	71	24.7	17	23.9	4	5.6	50	70.4
C50	Breast	50	17.4	27	54.0	7	14.0	16	32.0
C51	Vulva	4	1.4	3	75.0			1	25.0
C53	Cervix uteri	3	1.0	3	100.0				
C54	Corpus uteri	9	3.1	4	44.4	2	22.2	3	33.3
C56	Ovary	10	3.5	3	30.0	2	20.0	5	50.0
C64	Kidney	7	2.4	2	28.6	3	42.9	2	28.6
C67	Bladder	5	1.7	2	40.0	2	40.0	1	20.0
C70-C72	CNS cancer	12	4.2	4	33.3	2	16.7	6	50.0
C76-C79	CUP	4	1.4	1	25.0			3	75.0
C82-C85	NHL	16	5.6			2	12.5	14	87.5
C90	Mult. myeloma	6	2.1			2	33.3	4	66.7
C91-C96	Leukaemia	6	2.1			1	16.7	5	83.3
Other primaries		18	6.3	7	38.9	2	11.1	9	50.0
All mult. primaries		287	100.0	93	32.4	37	12.9	157	54.7

Multiple primaries with number of cases 1 to 2 are pooled in category "Other primaries".

ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a multiple malignancy.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**Singular primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4	3	3	0.2	0.03	0.2	0.04	10.7	12.5
5- 9	7	6	0.5	0.13	0.4	0.16	19.4	16.2
10-14	8	9	0.5	0.27	0.6	0.35	22.9	31.0
15-19	4	5	0.3	0.13	0.3	0.28	9.5	15.2
20-24	11	5	0.6	0.73	0.3	0.38	13.1	10.6
25-29	6	2	0.3	0.46	0.1	0.22	6.1	1.8
30-34	7	2	0.3	0.35	0.1	0.33	3.9	1.0
35-39	10	9	0.4	0.34	0.4	0.56	2.7	1.9
40-44	11	2	0.4	0.25	0.1	0.07	1.4	0.2
45-49	12	12	0.5	0.19	0.5	0.41	0.7	0.7
50-54	18	12	0.9	0.16	0.6	0.28	0.6	0.5
55-59	46	20	2.5	0.32	1.0	0.27	0.9	0.5
60-64	70	41	3.9	0.37	2.2	0.33	0.9	0.8
65-69	126	51	8.0	0.51	3.0	0.39	1.3	0.8
70-74	155	91	12.1	0.68	6.0	0.66	1.4	1.2
75-79	155	92	18.8	0.78	7.7	0.64	1.6	1.1
80-84	132	108	26.4	0.89	11.6	0.77	1.6	1.2
85+	104	127	30.5	0.80	14.2	0.55	1.5	1.2
All ages	885	597					1.4	1.0
Mortality								
Raw			3.0	0.49	1.9	0.46		
WS			1.6	0.35	0.8	0.30		
ES			2.3	0.43	1.1	0.37		
BRD-S			3.2	0.52	1.5	0.44		
PYLL-70								
per 100,000			18.6		12.3			
ES			19.1		13.6			
AYLL-70			14.7		18.3			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4	3	3	0.2	0.03	0.2	0.04	11.1	12.5
5- 9	6	5	0.4	0.11	0.4	0.14	17.1	13.9
10-14	8	7	0.5	0.29	0.5	0.27	22.9	25.9
15-19	4	5	0.3	0.13	0.3	0.28	9.5	17.9
20-24	9	4	0.5	0.60	0.2	0.31	11.4	9.1
25-29	5	2	0.2	0.38	0.1	0.22	5.4	1.9
30-34	7	2	0.3	0.37	0.1	0.33	4.0	1.1
35-39	9	9	0.4	0.32	0.4	0.56	2.5	2.1
40-44	10	2	0.4	0.24	0.1	0.07	1.3	0.2
45-49	10	10	0.4	0.17	0.4	0.37	0.7	0.6
50-54	17	10	0.8	0.18	0.5	0.26	0.7	0.4
55-59	36	18	2.0	0.31	0.9	0.28	0.8	0.5
60-64	48	34	2.7	0.35	1.8	0.30	0.7	0.7
65-69	82	43	5.2	0.43	2.5	0.41	1.0	0.8
70-74	106	72	8.3	0.62	4.7	0.58	1.2	1.1
75-79	108	70	13.1	0.66	5.9	0.56	1.3	1.0
80-84	93	92	18.6	0.71	9.9	0.72	1.5	1.2
85+	82	106	24.0	0.66	11.9	0.47	1.5	1.1
All ages	643	494					1.2	1.0
Mortality								
Raw			2.2	0.42	1.6	0.42		
WS			1.2	0.30	0.7	0.27		
ES			1.7	0.37	0.9	0.33		
BRD-S			2.3	0.44	1.2	0.40		
PYLL-70								
per 100,000			15.9		10.8			
ES			16.6		11.9			
AYLL-70			16.8		18.6			

* See corresponding tables with multiple primaries.

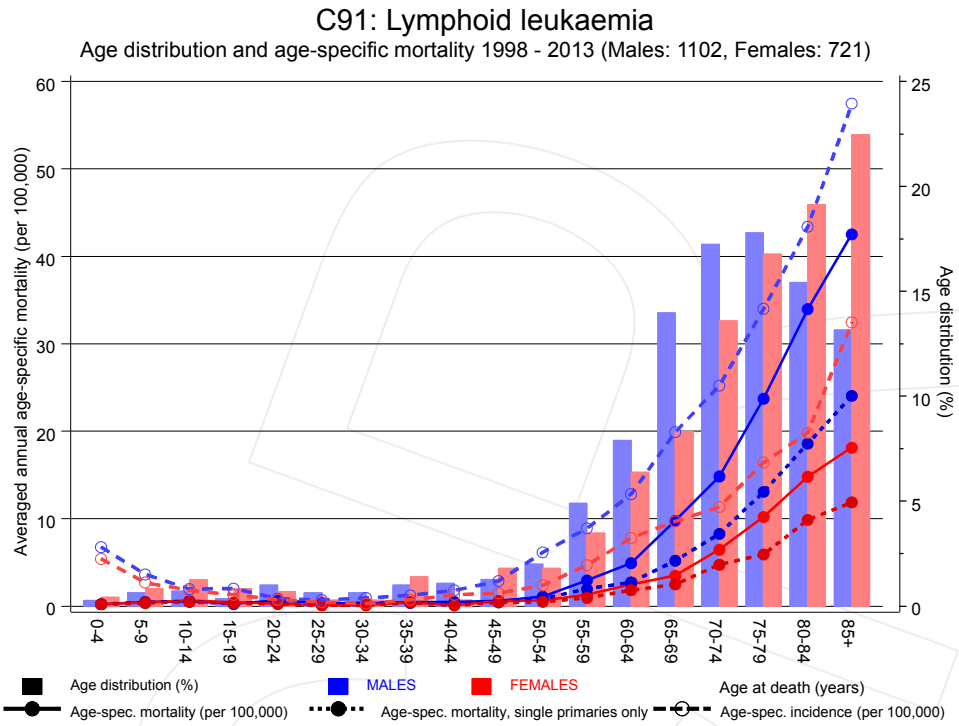
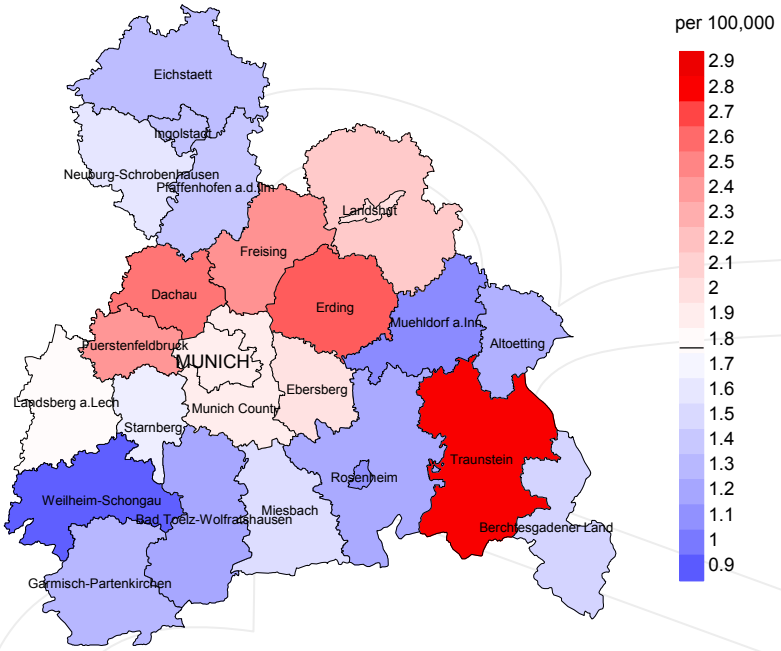


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

The difference between age at diagnosis (Table 3) and age at lymphoid leukaemia-related death (see Table 10) should be considered.

Average mortality (world standard population) 2007 - 2013: Males



Average mortality (world standard population) 2007 - 2013: Females

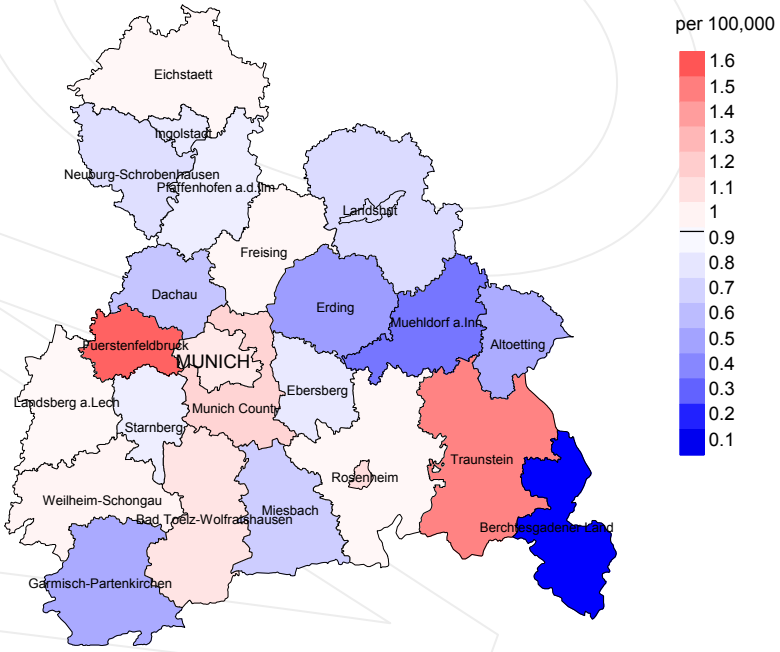
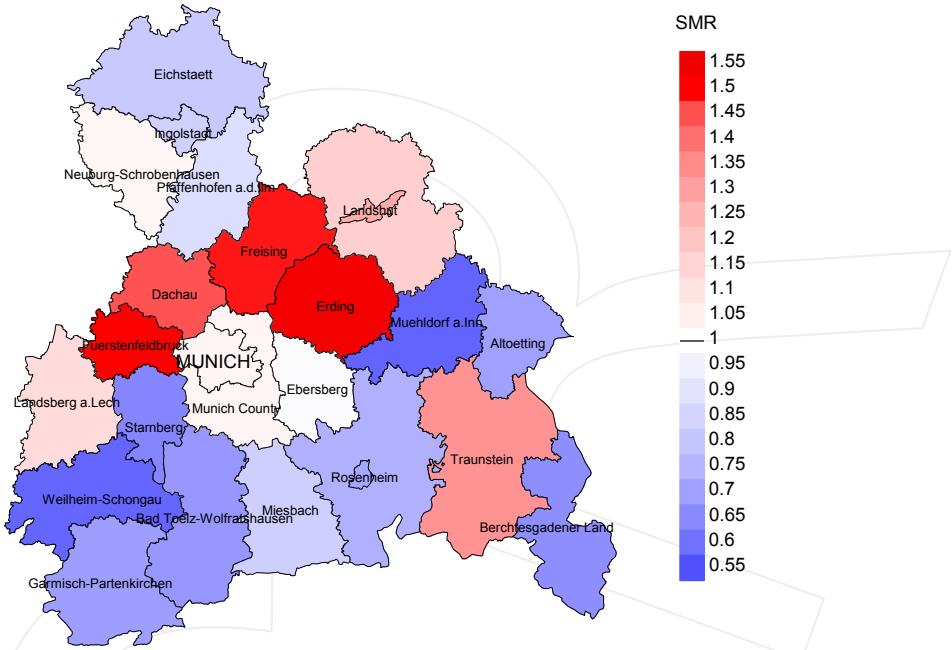


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2013. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 1.8/100,000 WS N=608, females 0.9/100,000 WS N=396).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 a total of 14 women died from lymphoid leukaemia. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 0.8/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.3 and 1.9/100,000.

Standardized mortality ratio (SMR) 2007 - 2013: Males



Standardized mortality ratio (SMR) 2007 - 2013: Females

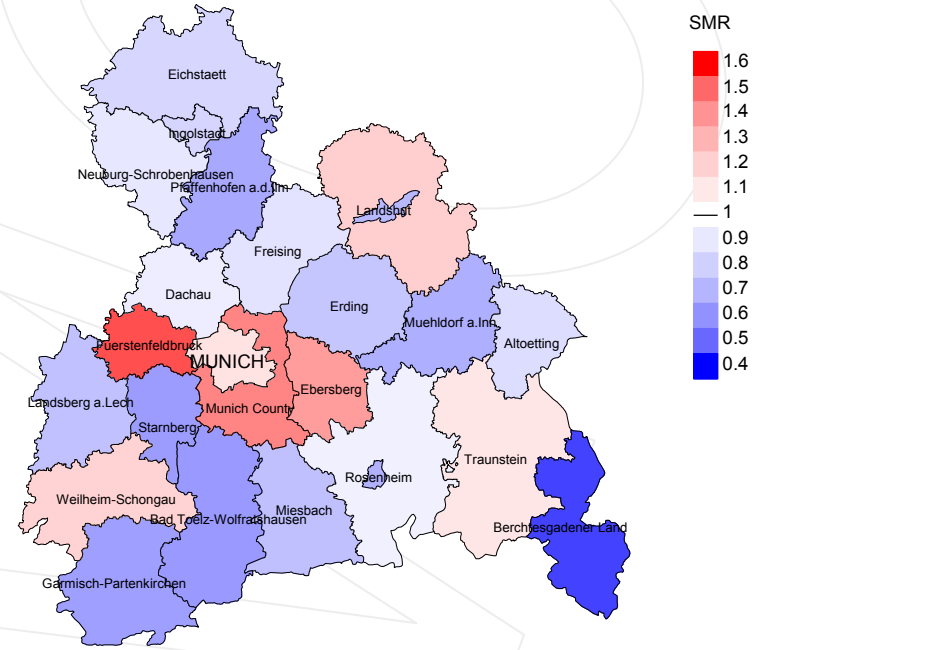


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=608, females N=396).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 a total of 14 women died from lymphoid leukaemia. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.37. Though, the value of this parameter may vary with an underlying probability of 99% between 0.61 and 2.64, and is therefore not statistically striking.

Statistical Notes

In all tables and figures the respective reference values should be carefully considered. The incidence rates include diagnoses (with multiple primary), and death certificate only (DCO) cases. For mortality statistics patients, diagnoses and progressive course of disease are presented. In the calculations, all courses of disease are considered whereby progressions occurred and/or death certificate identified progressive cancers were ascertained. Additionally there are three groups of disease course to consider:

1. **All multiple primaries included**

   The mortality statistic describes the tumor-specific death, independent of any malignancy. The patient perspective, induced secondary malignancies, and the problem of multiple malignancies from the same primary tumor all have reasons for their inclusion.

2. **First singular primary** (no information about other prior or synchronous malignancy)

   The mortality statistic describes the cancer-related death for patients who have no therapeutic restrictions due to a previous or synchronous cancer. These statistics are comparable to studies that have exclusion criteria based on a second malignancy.

3. **Single primary** (no information about other prior, syn- or metachronous malignancy)

   The mortality statistic describes the tumor-specific death that occurs without any impact through secondary primaries, earlier, synchronous, later or induced. Precisely the difference between disease group 1 and 2 highlight the magnitude of the problem of secondary malignancies.

For this reason differences appear concerning official mono-causal mortality statistics. To judge the maximum deviation, 2 further tables are presented. In the first table the distribution of secondary malignancies before, at or after the described cancer are shown, that could be an alternative cause of death. In the second table, the age-specific mortality rates for all courses of disease, without designation of secondary malignancies are shown.

A previously minimally acknowledged statistic is the **age at death**, which allows for a good assessment of the quality of classification of the apparent tumor-specific death. For assumed tumor-independent deaths, the age of death should be estimated from the age of diagnosis and the normal life expectancy, whereas tumor-dependent deaths can be estimated from the age of diagnosis plus the average tumor-specific life expectancy. The comparison of different tumors demonstrates this association, if the causes of cancer and the competing cause of death are independent of each other (e.g. breast and colon versus head/neck and lung).

The index from mortality and incidence (Mortality-Incidence ratio, **MI-index**) is a statistic that allows for the evaluation of the quality of data. For diseases with poor prognoses, comparable values are obtained from all age groups, because to a large extent, the numerator and denominator contain the same cases. For tumors with a good prognosis, increasing and decreasing incidence and age-specific differences in prognosis can more strongly alter the MI- index. Additionally, attention should be paid to the confidence intervals where fewer cases are reported.

The complexity of problems identified here emphasizes the importance of relative survival data for the appropriate analysis of long term results.

As a measurement of the burden of disease, the number of potential life years loss due to premature deaths in a cohort can be calculated (**PYLL**, potential years of life lost, standardized per 100,000 persons or per European standard) as well as the average loss of life years per individual (**AYLL**, average years of life lost). Depending upon the analytic aim (health economy, prevention, health care research) different methods exist for the generation of these measurements. In the results presented here, the age for a premature death is considered to be before 70 years, according to the guidelines of the OECD and the WHO (as seen in the abbreviation PYLL-70 or AYLL-70).

Shortcuts

FRG	Federal Republic of Germany
GEKID	Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
MCR	Munich Cancer Registry (Tumorregister München)
SEER	Surveillance, Epidemiology, and End Results (USA)
AYLL-70	Average years of life lost prior to age 70 given a person dies before that age
BRD-S	German standard population
DCO	Death certificate only
EAR	Excess absolute risk = excess cancer cases (O - E) per 10,000 person-years
ES	European standard population (old)
LCL	Lower confidence limit
MI-index	Ratio between mortality and incidence
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
SIR	Standardized incidence ratio
SMR	Standardized mortality ratio
UCL	Upper confidence limit
WS	World standard population

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